Power Management Systems & Products

Contents

Power Management Systems & Products
Overview
Power Xpert® Architecture Introduction 2.0-3
Power Xpert Meters
Power Xpert Meters 2.1-1
Ethernet-Ready Power Quality & Energy (PQ&E) 2.1-2
Power Xpert Network Connectivity
Power Xpert Gateways 2.2-1
Ethernet-Enabled Power Quality & Energy (PQ&E) — IQ Meters . 2.2-12
Ethernet-Enabled Circuit Breaker Trip Units and Protective Relays 2.2-13
Ethernet-Enabled MCC 2.2-14
IPONI Communication Modules 2.2-15
Breaker Interface Module 2.2-16
Power Management Systems Central Energy Display (CED) 2.2-17
I/O Devices Digital Input Module (DIM) 2.2-19
Addressable Relay II 2.2-20
Power Xpert Ethernet Switches
Power Xpert Ethernet Switches 2.3-1
Copper Ethernet Cable Wiring Guidelines 2.3-2
Fiber Optic Cable Wiring Guidelines 2.3-3
Powerware X-SLOT Connectivity Options
Power Xpert Gateway Series 1000 Card (PDU) 2.4-1
Power Xpert Gateway Series 2000 Card (UPS) 2.4-3
Power Xpert Monitoring Software
Power Xpert Software Server Core 2.5-1
Server Core Optional Modules/Hardware 2.5-3
Ethernet NetLink 2.5-4
Server Core Hardware/Software Requirements 2.5-6
Ethernet-Enabled Software Monitoring of IT and Facility Power Equipment 2.5-7
Power Xpert Software Foreseer Class 2.5-8
Custom Ethernet-Enabled Software Monitoring of IT and Facility Power Equipment 2.5-10
Power Management Systems & Products for Third-Party Integration
Power Xpert Gateway 400/600 . . . . . 2.6-1
RS-485 PONI 2.6-1
DPONI 2.6-1
mMINT 2.6-2
Modbus® NetLink 2.6-3

Contents (Continued)

Specifications

See Eaton's Cutler-Hammer® Product Specification Guide on enclosed CD-ROM:

CSI Format	1995	2004
	Section 16901 & 16911	**Section 26 27 13.11 & Section 26 09 13.13**
Addressable Relay II	**Section 16902, Paragraph 2.02.C**	**Section 26 29 05, Paragraph 2.02.C**
Analog Input Module	**Section 16901, Paragraph 2.05.B**	**Section 26 27 13.11, Paragraph 2.05.B**
BIMII	**Section 16901, Paragraph 2.04.A**	**Section 26 27 13.11 & Paragraph 2.04.A**
Breaker Controller	**Section 16902, Paragraph 2.02.D**	**Section 26 29 05, Paragraph 2.02.D**
CMU	**Section 16901, Paragraph 2.04.B**	**Section 26 27 13.11 & Paragraph 2.04.B**
SMLD	**Section 16901, Paragraph 2.04**	**Section 26 27 13.11 & Paragraph 2.04**

Power Xpert Architecture Introduction

Enabling Power System Management

Eaton's Power Xpert Architecture (PXA) provides a complete hardware/software solution to manage your entire power system. Power Xpert Architecture consists of Power Xpert Meters, Gateways, Switches and Software.

Power Xpert devices are devices that can provide by themselves, or facilitate for others, Ethernet network protocols to communicate with your critical infrastructure components. Power Xpert devices provide the intelligent hardware connectivity layer to allow Web-enabled communications throughout the power system.

Power Xpert Meters

Power Xpert Meters provide measurement of the critical elements found in power systems, including voltage, power, current, transients, harmonics or even time. Power Xpert Meters provide Web-enabled communications for use through a Web browser or with the Power Xpert Software or third-party monitoring systems.

Power Xpert Gateways

Power Xpert Gateways are capable of Web-enabling electrical devices contained in electrical gear via a standard Web-browser on the Ethernet network. Standard on-board Web pages eliminate the need for any customer programming or software.

Power Xpert Software

Power Xpert Software is a comprehensive solution for system-level management of your power infrastructure via a Web-browser. Power Xpert Software provides a clear picture of what is happening at a component, device and system level.

Power Xpert Software Server Core is directly compatible with exiting PowerNet systems v.3.32 and higher. All communications hardware devices such as Netlink, EMINT, MINTII and EPONI can be connected to Power Xpert Software through the PowerNet server for configuration of the INCOM communication devices. Power Xpert Software is available in two classes:

Server Core Class — designed for clients who need:

- To monitor multiple devices from a centralized server.
- A feature-to-price ratio of extraordinary value.
- The option of self-customization or occasional support from service professionals.
- Ability to interface to the most common network-based equipment.

Foreseer Class — designed for enterprises that need:

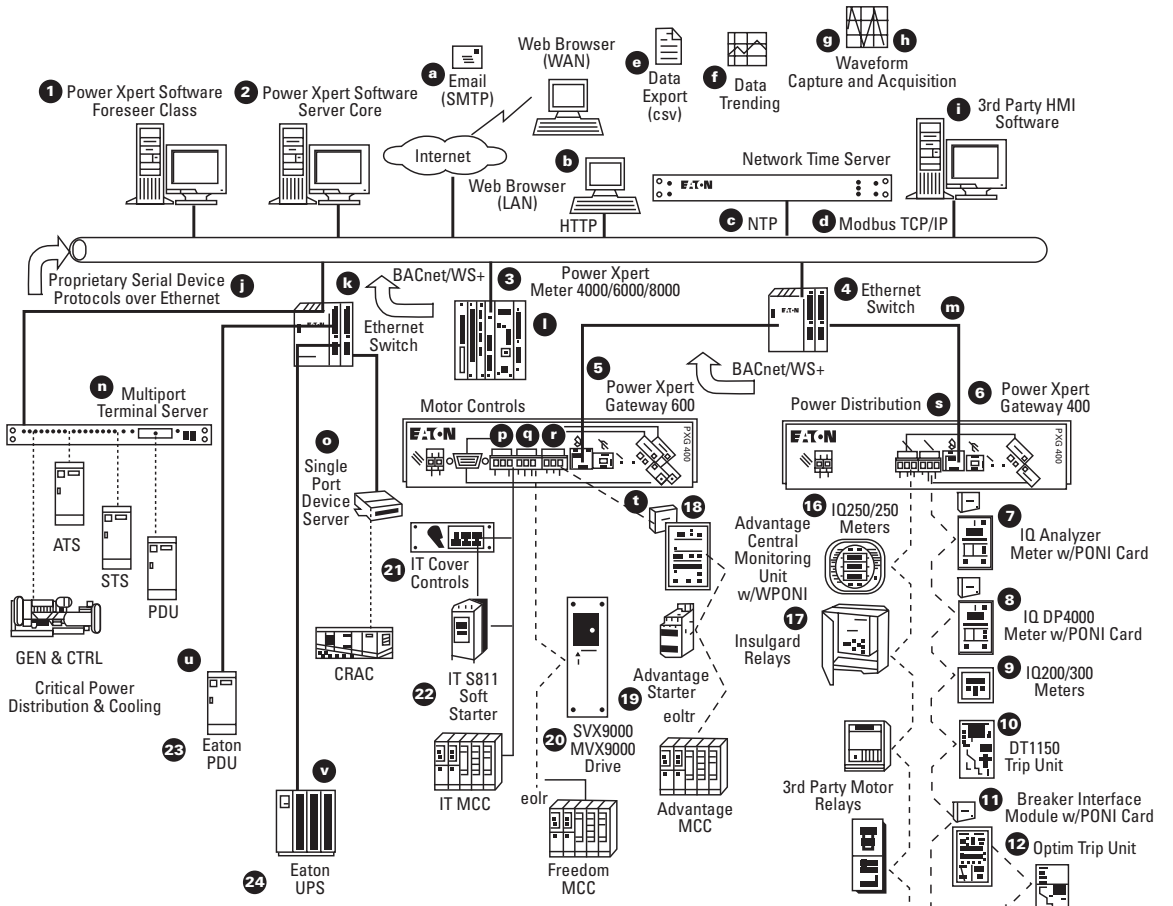
- To monitor large facilities, located around the country or around the globe.
- Enterprise scalability.
- To view all facilities as one entity.
- Specialized serial drivers.
- To gather, monitor and collect data from thousands of devices.
- Custom communication protocols.
- A turnkey specialized system.

Support for Existing PowerNet Systems

Power Xpert Software, Server Core Class is directly compatible with existing PowerNet systems v.3.32 and higher. All communications hardware devices such as NetLink, EMINT, MINT II and EPONI can be connected to Power Xpert Software through the PowerNet server for configuration of the INCOM communication devices.

2

Power Xpert System



#	Product Name	Section Reference
1	Power Xpert Foreseer Class Software	2.6-8
2	Power Xpert Server Core Software	2.0-1, 2.6-1, 2.6-6, 2.6-11
3	Power Xpert 4000/6000/8000 Meter	2.1-1, 3.1-1
4	Power Xpert 6-Port Ethernet Switch	2.3-1
5	Power Xpert Gateway 600	2.2-1
6	Power Xpert Gateway 400	2.2-1
7	IQ Analyzer	3.2-1
8	IQ DP-4000	3.2-10
9	IQ200/300 Series Meters	3.2-13, 3.2-17
10	Digitrip DT1150	2.2-3, 18.0-29
11	Breaker Interface Module	2.2-16, 6.0-14, 20.1-9, 21.0-14, 27.1-21
12	Optim Trip Unit	21.0-1, 21.0-6, 21.1-14
13	MP3000/MP4000/MD3000 DT3000/FP4000/FP5000	4.0-1, 4.2-11, 4.2-12 4.3-1, 4.1-9, 4.1-12
14	Central Energy Display	2.2-17
15	Energy Power Sentinel	3.2-27
16	IQ250/260 Meter	3.1-29
17	Insulgard Relay	5.3-1, 6.0-15, 7.3-4, 8.0-9
18	Advantage Central Monitoring Unit	3.6-14
19	Advantage Starter w/WPONI	30.0-1
20	SVX9000/MVX9000 Drive	30.1-29, 32.4-1, 32.1-1
21	IT Cover Control	2.2-14
22	IT S811 Soft Starter	2.2-14, 30.1-12
23	Eaton PDU w/PXGX1000 Card	2.5-1
24	Eaton UPS w/PXGX2000 Card	2.5-3

Figure 2.0-1. Power Xpert System Overview
See Notes on **Page 2.0-5**.

Power Xpert System — Notes

a. Simple Mail Transfer Protocol (SMTP) — Device events and periodic data log file attachments are sent to users in the form of an email from the following Power Xpert products: Power Xpert Foreseer Class Software, Power Xpert Server Core Software, Power Xpert Meters 4000/6000/8000, Power Xpert Gateway 600 and Power Xpert Gateway Cards 1000/2000 Series.

b. Hyper Text Transfer Protocol (HTTP) — Web browser access is available on the following Power Xpert products: Power Xpert Foreseer Class Software, Power Xpert Server Core Software, Power Xpert Meters 4000/6000/8000, Power Xpert Gateway 600 and Power Xpert Gateway Cards 1000/2000 Series.

c. Network Time Server (NTP) — Network Time Protocol (Client-side) is available on the following Power Xpert products: Power Xpert Foreseer Class Software, Power Xpert Server Core Software, Power Xpert Meters 4000/6000/8000, Power Xpert Gateway 600 and Power Xpert Gateway Cards 1000/2000 Series.

d. Modbus TCP/IP — Modbus TCP/IP over Ethernet is available on the following Power Xpert products: Power Xpert Foreseer Class Software, Power Xpert Server Core Software, Power Xpert Meters 4000/6000/8000, Power Xpert Gateway 600 and Power Xpert Gateway Cards 1000/2000 Series. Modbus register maps are available online at www.eaton.com/powerxpert

e. Data Export — Data files consist of metered data and event log information that is exported from the meter, gateway or software in the form of a .csv (comma separated variable) file. Supported products are: Power Xpert Gateway PXG600, PXGX1000, PXGX2000, Power Xpert Meter 4000/6000/8000 and Power Xpert Server Core software.

f. Data Trending — Viewing trended data in a standard web browser interface in the form of a graphed line for one or more data points is available for the following products: Power Xpert Gateway PXG600, PXGX1000, PXGX2000, Power Xpert Meter 4000/6000/8000 and Power Xpert Server Core software.

g. Waveform Capture — The ability to capture a waveform and/or export the waveform as a standard comtrade file format is available on the following products: Power Xpert Meter 4000/6000/8000.

h. Waveform Acquisition and Export — The ability to acquire a waveform from another device that natively captures a waveform internally and then export that waveform in a standard comtrade file format is supported by the following devices: PXG600 (provides data acquisition and comtrade conversion for: IQ Analyzer, DT1150 and FP5000).

Note: The Power Xpert Meters 4000/6000/8000 also export natively captured waveforms as comtrade file format.

i. Third-Party HMI Software Integration — Is achieved through the Modbus TCP/IP interface on all Power Xpert devices. If PowerNet software is utilized in the system, then an OPC Server is available.

j. Proprietary Serial Device Protocols over Ethernet — The ability to communicate with third-party equipment is achieved by first converting the physical serial media to Ethernet by using a standard serial to Ethernet multiport terminal server (see Note k.). Next, a device driver library is required to convert the proprietary protocol to an Eaton internal standard to allow the data to be integrated within Eaton software. Products that support this type of third-party device integration are: Power Xpert Foreseer software.

k. BACnet/WS+ — Is based upon the protocol specification developed by the ASHRAE standards group as an Addendum c to Standard 135-2004.

Reference: [BACnet — A Data Communication Protocol for Building Automation and Control Networks. Public Review Draft, ASHRAE Standard. BSR/ASHRAE Addendum c to ANSI/ASHRAE Standard 135-2004. First Public Review. Released: October 22, 2004. 32 pages. Copyright (c) American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. August 30, 2004.]

This draft shows proposed changes to the current BACnet standard.

Note: Eaton Corporation has extended this protocol addendum with a (+) to signify the addition of an "event-driven" behavior to the existing "polled" data acquisition model. This allows optimization in communications between Power Xpert devices and Power Xpert Software.

l. CEC (Communications Expansion Card) — This card must be ordered as an option to provide Ethernet connectivity for use with a web browser, interface to Power Xpert Software or third-party HMI software.

m. Ethernet Switch — The Eaton Ethernet Switch provides connectivity between Power Xpert devices on a common sub network. The 6-port version of the switch shown provides (6) RJ45 network ports. As an option 1 or 2 of these ports can be substituted to be ST-Type Fiber connections.

n. Multiport Terminal Server — Is a device that is used to add network connectivity to serial devices. These terminal servers offer 8 or 16 RS-232/485 serial ports to connect a variety of serial devices including meter devices, UPS, PDU, Static Switch, Automatic Transfer Switch, generators, Computer Room Air Conditioners, and other commercial, industrial or business automation equipment. The serial ports use standard RJ45 or DB-9 connectors for convenient cabling, and optional adapters are available as well.

2

o. Single-port Device Server — Is a device that is used to add network connectivity to a single serial device. These device servers offer a single RS-232/485 serial port to connect a variety of serial devices including meter devices, UPS, PDU, Static Switch, Automatic Transfer Switch, generators, Computer Room Air Conditioners, and other commercial, industrial or business automation equipment. The serial ports use standard RJ45 or DB-9 connectors for convenient cabling, and optional adapters are available as well.

p. PXG600A COM2 Port — Is used to communicate on a Modbus RS-232/485 network or on an Eaton QC-Port (IT) bus. The user may choose between a DB-9 or terminal strip connector to connect up to 32, RS-45 serial devices.

q. PXG600A COM1 Port — Is used to communicate on a Modbus RS-232/485 network or on an Eaton QC-Port (IT) bus. A terminal strip connector is provided for this interface. Up to 32 devices may be connected to this port.

r. PXG600A INCOM Port — Is used to communicate on an Eaton INCOM device network only. Up to 64 devices may be connected to this port.

s. PXG400 Ports — The ports on the PXG400 operate the same as on the PXG600; however, there is only one RS-232/485 port to be used for Modbus or QC-Port.

t. PONI (Product Oriented Network Interface) — Is used to connect the Advantage Central Monitoring Unit (23), the Breaker Interface Module (14) and the Central Energy Display (17) to an INCOM network.

u. PXGX1000 Card — Is used to connect an Eaton PDU (Power Distribution Unit) or RPP (Remote Power Panel) to an Ethernet network. Available interfaces are: HTTP (web) SNMP, SMTP (email), Modbus TCP/IP and BACnet/WS+.

v. PXGX2000 Card — Is used to connect an Eaton UPS to an Ethernet network. Available interfaces are: HTTP (web) SNMP, SMTP (email), Modbus TCP/IP and BACnet/WS+.

Important Note: When connecting multiple Modbus RTU devices to either a multiport terminal server or a Power Xpert Gateway 400/600 over an RS-485 daisy chain network, the baud rate, data frame (stop bits, data bits and parity), byte order (standard or reversed) and physical wiring (2-wire or 4-wire) must be the same for all devices connected.

Power Xpert Meters

Power Xpert Meter and Display

General Description

The Power Xpert 4000/6000/8000 Series Meter monitors the critical aspects of an electrical distribution system. This premier power quality metering instrument is simple to use, powerful, scalable and highly flexible.

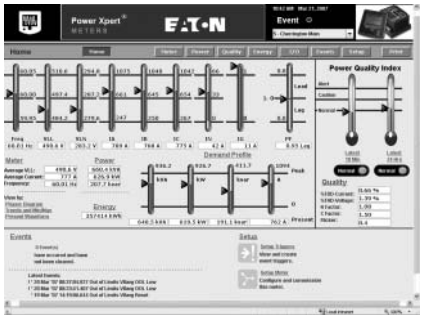
The Power Xpert 4000/6000/8000 meters offer a new level of intuitive user interface design, presenting critical electrical distribution system information in simple-to-navigate and easy-to-understand information architecture. The Power Xpert 4000/ 6000/ 8000's Graphic Display visualizes the information from up to 16 meter modules. The embedded Web server displays complex power quality data using standard Internet browsers and allows for device configuration from the browser.

Both the local graphic display and the embedded Web server present real time, historical and event information in a browser-style graphical format to help the user interpret key circuit information, such as:

- Current loading
- Voltage and power levels
- Power factor
- Energy usage
- I/O status
- Power quality measurements
- Harmonic plots
- Disturbance and transient waveforms
- ITIC disturbance summary screen.

The Power Xpert 4000/6000/8000 Graphic Display uses a simple "twist and click" navigation control dial to easily navigate the menus and drill down into increasing levels of important detail. A "back" key enhances the browser like navigation of the graphic display.

The Web server provides the energy and demand readings required to help manage the cost of energy. It also provides critical information regarding power quality, such as harmonic distortion, flicker, crest factor, K-Factor and more. For more details of the Power Xpert 4000/6000/8000 Meter Series, refer to **Section 3**.



Power Xpert Home Page

The Power Xpert Meter home page, viewed in a standard Web browser, summarizes the top level critical power quality information on a single page. Complex power quality data is presented in useful and simple graphical charts and gauges.

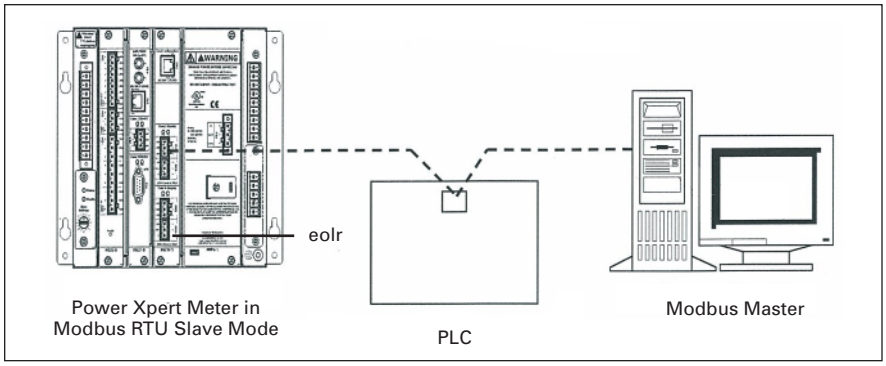


Figure 2.1-1. RS-485 Network

1. When using Modbus RTU over an RS-485 communications network, the data rate, data protocol (data bit, stop bit and parity) and wiring topology (two-wire or four-wire) must be the same for each of the devices.
2. Connections should be made using communication/control shielded cable equivalent to Belden cable p/n 9463.

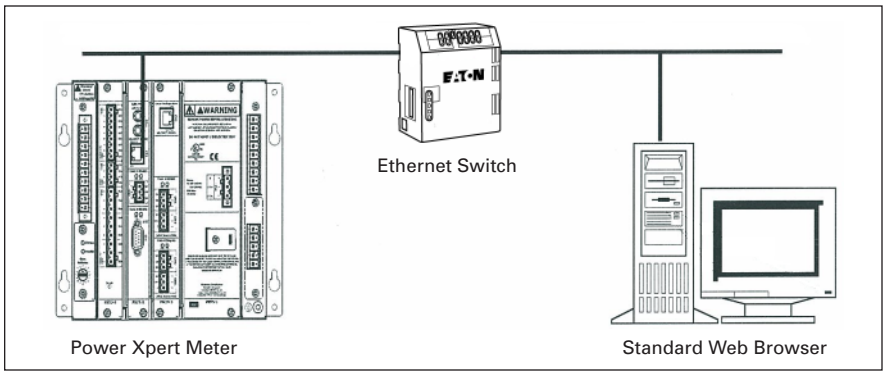


Figure 2.1-2. Ethernet Network

1. Optional Ethernet Communications Card must be ordered with the meter.
2. Available Ethernet connections are: 10Base-T and ST fiber.
3. Power Xpert Ethernet Switches series of Eaton Ethernet Switches are available.

Ethernet-Ready Power Quality & Energy (PQ&E) — Power Xpert Meters

General Description

One or more Ethernet-ready PQ&E Power Xpert Meters may be deployed in various power distribution and motor control applications.

Equipment:

- Power Xpert 4000 Meter
- Power Xpert 6000 Meter
- Power Xpert 8000 Meter

Options:

- Ethernet Expansion Card — CEC (Recommended one per meter)
- Local Display (one per 16 meters)

Communication Interfaces:

- Modbus RTU (RS-485) (Standard)
- Display Link (RS-485) (Standard)
- Modbus TCP/IP (with CEC)
- HTTP (with CEC)
- FTP (with CEC)
- SMTP (with CEC)
- SNMP (with CEC)
- XML/SOAP (with CEC)

Metering/Monitoring Applications:

- Identify power quality Problems, view waveforms, monitor circuit loading, and manage energy utilization via standard web browser (PXM4000/6000/8000).
- View ITIC plots, Enhanced Power Quality Index (PQI), and Event/ Calendar View via Web Browser (PXM6000/8000).
- Detect and record high-speed transients (PXM8000).

Installation Applications:

- Low Voltage Switchgear
- Medium Voltage Switchgear
- Low Voltage Motor Control Centers
- Medium Voltage Motor Starters

Communications Applications:

- Building Management System (BMS)
- Energy Management Systems
- Network Management Systems
- HMI
- Power Xpert Server Core Software
- Power Xpert Foreseer Class Software

Layout Diagrams

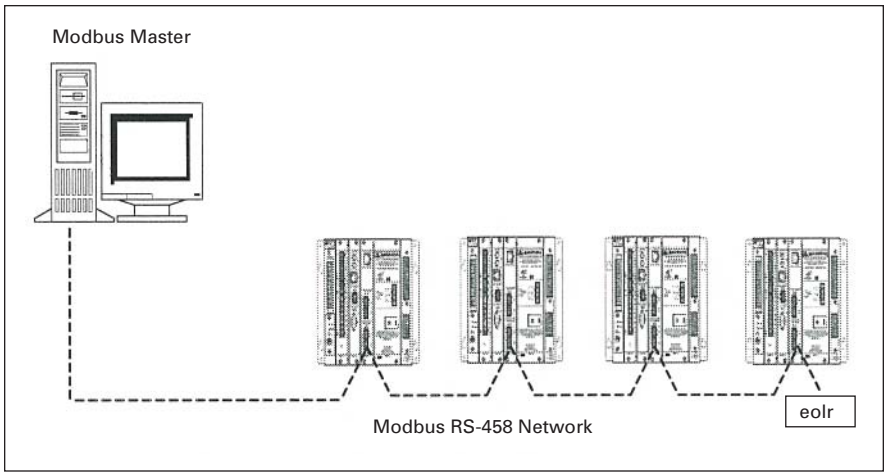


Figure 2.1-3. Power Xpert Meter Used in a Modbus RS-485 Network Application

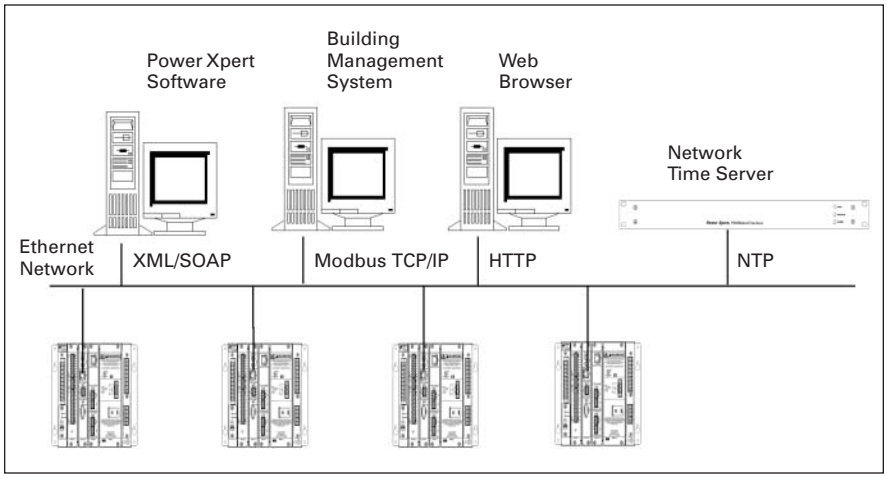


Figure 2.1-4. Power Xpert Meter Used in an Ethernet Network Application

Power Xpert Gateways

The Power Xpert Gateway 400/600 is typically installed in an electrical assembly — a motor control center, low/medium voltage switchgear or switchboard to consolidate data available from components such as trip units, meters, motor controllers and protective relays.

General Description

Power Xpert Gateways provide a cost-effective method to easily Web-enable Eaton and third-party products.

The Gateway consists of an embedded Web server that allows the user to connect to Eaton products such as breakers, meters and relays found in MCCs, LV and MV Switchgear and switchboards — to name a few — that communicate via Eaton protocols INCOM and QCPort, in addition to third-party products that communicate via Modbus RTU. The Gateway provides the central connection point for the power metering/monitoring/protective devices, allowing their parameters to be monitored via the Web.

Power Xpert Gateways provide data communications to Eaton's Power Xpert Software to facilitate centralizing and gathering data for long-term data archival, analysis and trending features.

The PXG is compatible with and facilitates integration with many third-party building and factory automation systems via Modbus TCP and Web Services.

The PXG600 allows you to enable pre-selected parameters to be trended for each supported device. Selecting the trend symbol will generate a real-time graph for that parameter and can be viewed for the past 24 hours, seven days, 30 days or all past history.

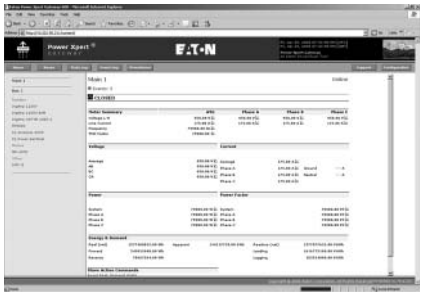
The PXG600 also offers direct email notifications to up to 10 users. Select from event notifications, data logs, event logs and heartbead emails.

Information is presented in organized, user-friendly Web pages and includes, but is not limited to, the following:

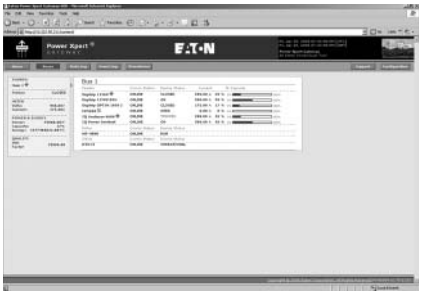
- Device Status
- Comm Status
- Voltage
- Current
- Power
- Power Factor
- Energy
- Power Quality
- Temperature
- I/O States

Power Xpert Gateway Screenshots

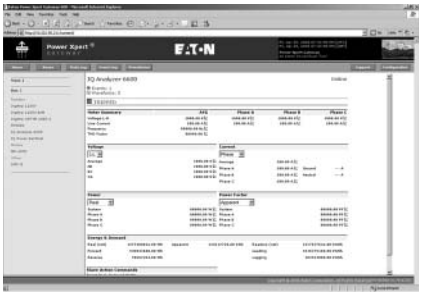
Home Page



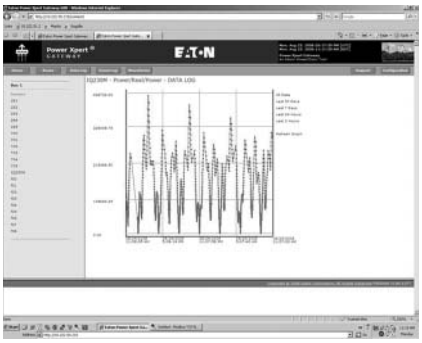
Main Page



Bus Page



Device Page



Trending Page (PXG600 Only)

2

Table 2.2-1. Features of the Power Xpert Gateway 400 vs. 600

Features	PXG 400	PXG 600
Total Number of Supported Devices	64	96
Maximum Number of INCOM Devices Supported	64	64
Protocols Supported on Downstream Devices: INCOM, QCPort and Modbus RTU	Yes	Yes
Number of Downstream Communication Ports	2	3
Number of Downstream Protocols Supported Simultaneously	2	3
USB Port for Configuration	Yes	Yes
Modbus TCP/IP Protocols Supported	Yes	Yes
SNMP Client Access	Yes	Yes
INCOM Slave Action Commands Supported	Yes	Yes
INCOM Date and Time Settings Supported	Yes	Yes
Modbus Writes Supported	Yes	Yes
Device Summary Screen per Communication Port	Yes	Yes
Device Waveform Access and Storage — COMTRADE File Format	No	Yes
Set User-Defined Events	No	Yes
Trend Graphs Displayed	No	Yes
Data Logging — csv File Format, Downloadable to Excel	No	Yes
Event Notification via the Web Interface	Yes	Yes
Event Logs — csv File Format, Downloadable to Excel	No	Yes
E-mail Notification on Events and Threshold Alarms	No	Yes
Secure Ethernet Communications — SSL Encryption	Yes	Yes
Secure Communication Ports via Access Control/Trusted Host List	Yes	Yes
Save and Restore Configuration File	Yes	Yes

The Eaton Power Xpert Gateway 400/600 Includes:

- The Power Xpert Gateway Module.
- Mounting provisions and required hardware for panel and DIN rail mounting.
- CD-ROM: contains the User Manual, Modbus Register Maps, USB Driver and other associated files.

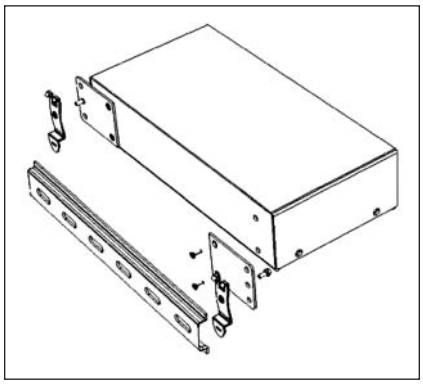


Figure 2.2-2. Power Xpert Gateway 400 with DIN Rail Mounting (Brackets Included)

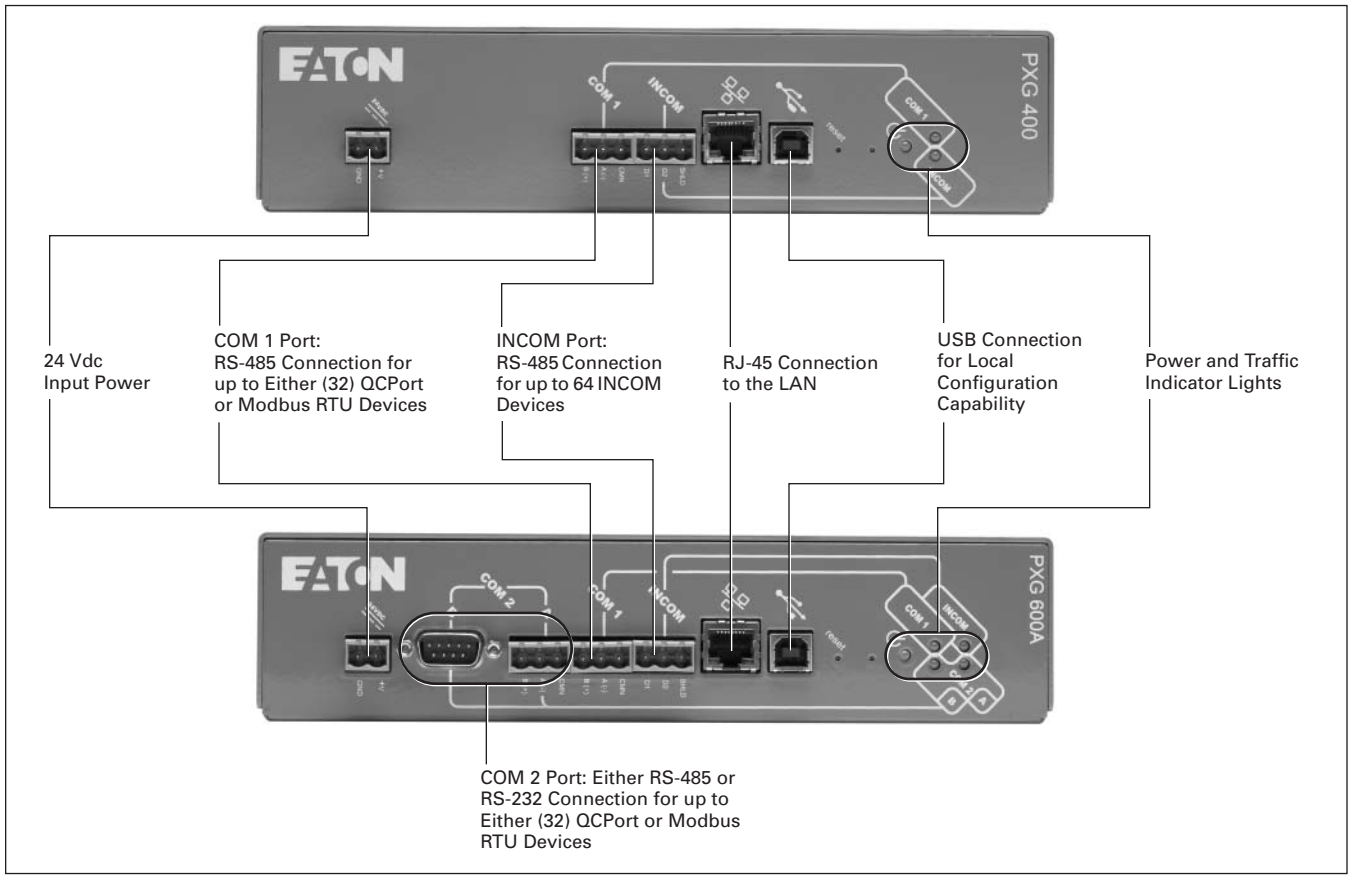

PXG 400
PXG 600A
24 Vdc Input Power
COM 1 Port: RS-485 Connection for up to Either (32) QCPort or Modbus RTU Devices
INCOM Port: RS-485 Connection for up to 64 INCOM Devices
RJ-45 Connection to the LAN
USB Connection for Local Configuration Capability
Power and Traffic Indicator Lights
COM 2 Port: Either RS-485 or RS-232 Connection for up to Either (32) QCPort or Modbus RTU Devices

Figure 2.2-1. Power Xpert Gateway 400/600

Table 2.2-2. Data Acquisition and Integration Table For Supported Devices

Supported Devices										
Device Type	Device Name	PXG 400 and PXG 600					PXG 600 Only			
		HTTP (Web Browser)	Web Services (Power Xpert Server Core Class)	Modbus TCP (BMS & SCADA)	Pass-through INCOM (PowerNet)	Pass-through QCPort (CHStudio)	SNMP (NMS)	SMTP (E-mail Client)	File Export (Data File Format)	File Export (Waveform File Export)
INCOM										
Drive	Accutrol 400	■	■	■	■		■	■	■	
Drive	AF97	■	■	■	■		■	■	■	
I/O	Universal RTD	■	■	■	■		■	■	■	
I/O	DIM	■	■	■	■		■	■	■	
Meter	IQ DP-4000 ①	■	■	■	■		■	■	■	
Meter	IQ Energy Sentinel	■	■	■	■		■	■	■	
Meter	IQ220/IQ320	■	■	■	■		■	■	■	
Meter	IQ230/IQ330	■	■	■	■		■	■	■	
Meter	IQ Analyzer (6000/6200) ①	■	■	■	■		■	■	■	■
Meter	IQ Analyzer (6400/6600) ①	■	■	■	■		■	■	■	■
Meter	IQ Data ①	■	■	■	■		■	■	■	
Meter	IQ Data Plus ①	■	■	■	■		■	■	■	
Meter	IQ Data Plus II ①	■	■	■	■		■	■	■	
Meter	Power Manager	■	■	■	■		■	■	■	
Meter	IQ Power Sentinel	■	■	■	■		■	■	■	
Protective	Digitrip 3000	■	■	■	■		■	■	■	
Protective	Digitrip 3200	■	■	■	■		■	■	■	
Protective	FP-5000	■	■	■	■		■	■	■	■
Protective	FP-4000	■	■	■	■		■	■	■	■
Protective	MP-3000 ①	■	■	■	■		■	■	■	
Protective	MP-4000 ①	■	■	■	■		■	■	■	
Protective	Digitrip 520MC	■	■	■	■		■	■	■	
Protective	IQ 500	■	■	■	■		■	■	■	
Protective	MPCV Relay	■	■	■	■		■	■	■	
Protective	Digitrip 1150/DT1150V	■	■	■	■		■	■	■	■
Protective	Digitrip 810	■	■	■	■		■	■	■	
Protective	Digitrip 910	■	■	■	■		■	■	■	
Protective	Digitrip MV	■	■	■	■		■	■	■	
Protective	Digitrip OPTIM 1050	■	■	■	■		■	■	■	■
Protective	Digitrip OPTIM 550	■	■	■	■		■	■	■	
Protective	Digitrip OPTIM 750	■	■	■	■		■	■	■	
Starter	Advantage ②	■	■	■	■		■	■	■	
Starter	Advantage ACM ②	■	■	■	■		■	■	■	
Sub-network Master	AEM II ①	■	■	■	■			■	■	
Sub-network Master	BIM II ①	■	■	■	■			■	■	
Sub-network Master	CMU ②	■	■	■	■			■	■	
Sub-network Master	IQ CED II ①	■	■	■	■			■	■	
Transfer Switch	ATC-400 ①	■	■	■	■		■	■	■	
Transfer Switch	ATC-600 ①	■	■	■	■		■	■	■	
Transfer Switch	ATC-800 ①	■	■	■	■		■	■	■	

① Required IPONI for connection to the Power Xpert Gateway.
② Required a WPONI for connection to the Power Xpert Gateway.

Note: Information subject to change without notice. Visit www.eaton.com for latest up-to-date details on connectivity.

Table 2.2-2. Data Acquisition and Integration Table For Supported Devices (Continued)

Supported Devices										
Device Type	Device Name									
		PXG 400 and PXG 600					PXG 600 Only			
		HTTP (Web Browser)	Web Services (Power Xpert Server Core Class)	Modbus TCP (BMS & SCADA)	Pass-through INCOM (PowerNet)	Pass-through QCPort (CHStudio)	SNMP (NMS)	SMTP (E-mail Client)	File Export (Data File Format)	File Export (Waveform File Export)
Modbus										
Drive	MVX9000	■	■	■			■	■	■	
Drive	SVX9000	■	■	■			■	■	■	
Insulation Monitor	Insulgard	■	■	■			■	■	■	
Meter	IQ230M/IQ330M	■	■	■			■	■	■	
Meter	IQ250	■	■	■			■	■	■	
Meter	IQ260	■	■	■			■	■	■	
Meter	SQD CM3000 Series	■	■	■			■	■	■	
Meter	SQD CM4000 Series	■	■	■			■	■	■	
Meter	SQD PM710	■	■	■			■	■	■	
Meter	SQD PM850	■	■	■			■	■	■	
Meter	PML 7350	■	■	■			■	■	■	
Meter	PML 7550	■	■	■			■	■	■	
Meter	PML 7650	■	■	■			■	■	■	
Protective	GE 369 Motor Relay	■	■	■			■	■	■	
Protective	GE 469 Motor Relay	■	■	■			■	■	■	
Temp Monitor	Qualitrol 118	■	■	■			■	■	■	
Transformer Differential Relay	ABB TPU 2000	■	■	■			■	■	■	
QCPort										
I/O	D77A-AI16	■	■	■		■	■	■	■	
I/O	D77A-AI8	■	■	■		■	■	■	■	
I/O	D77A-DI16	■	■	■		■	■	■	■	
I/O	D77A-DI8	■	■	■		■	■	■	■	
Starter	*IT.* S811 (MV811)	■	■	■		■	■	■	■	
Starter	*IT.* Starter ②	■	■	■		■	■	■	■	
Starter	*IT.* Starter QSNAP ②	■	■	■		■	■	■	■	

② Requires a QSNAP for connection to the Power Xpert Gateway.

Note: Information subject to change without notice. Visit www.eaton.com for latest up-to-date details on connectivity.

The table below represents many of the parameters displayed on the Web page for a given device, however it is not exhaustive. For the complete list of parameters display, per device, refer to the Device Data Map file at HYPERLINK http://www.eaton.com/powerxpert www.eaton.com/powerxpert.

Table 2.2-3. Web UI Device Parameters Displayed via Power Xpert Gateway

	Units	IQ Meters														Circuit Breaker Trip Units								Protective Relays						
		IQ Data Plus II	IQ Data Plus	IQ Data	IQ Analyzer 6000/6200	IQ Analyzer 6400/6600	IQ DP-4000	IQ 220/320	IQ 230/330	IQ 230/330M	IQ 250	IQ 260	IQ Power Sentinel	IQ Energy Sentinel	Power Manager	Digitrip 1150	Digitrip 520MC	Digitrip RMS 910	Digitrip RMS 810	Digitrip OPTIM 1050	Digitrip OPTIM 550	Digitrip OPTIM 750	Digitrip MV	Digitrip 3000	IQ 500	MPVCV Relay	FP-4000	FP-5000	MP-3000	MP-4000
Voltage																														
Average	V				■	■																				■	■		■
Voltage (Line-Line)	V	■	■	■	■	■	■	■	■	■	■	■	■			■		■									■	■		■
Voltage (Line-Neutral)	V	■	■	■	■	■	■	■	■	■	■	■	■		■											■	■	■		■
Current																														
Average	A				■	■																					■	■	■	■
Phase	A	■	■	■	■	■	■	■	■	■	■	■	■			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Ground	A				■	■				■						■	■	■	■	■	■	■	■	■	■				■	■
Neutral	A				■	■				■	■	■				■	■	■	■	■	■	■	■	■						
Peak	A				■	■	■	■	■	■	■	■				■				■	■	■	■	■			■	■		
Demand	A				■	■	■	■	■		■	■				■				■	■	■						■		
Power																														
Apparent	VA				■	■	■	■	■	■		■	■			■											■	■		■
Reactive	Var	■	■		■	■	■	■	■	■	■	■	■			■										■	■	■		■
Real	W	■	■		■	■	■	■	■	■	■	■	■	■	■	■		■	■	■						■	■	■		■
Power Factor																														
Apparent	PF	■	■		■	■	■	■	■	■	■	■	■			■											■	■		■
Displacement	PF				■	■	■	■	■	■			■														■	■		■
Energy																														
Real	Wh	■	■		■	■	■	■	■	■	■	■	■	■	■			■	■	■							■	■		■
Forward	Wh				■	■	■	■	■	■	■	■				■		■	■	■							■	■		
Reverse	Wh				■	■	■	■	■	■	■	■				■		■	■	■							■	■		
Apparent	Vah				■	■	■	■	■	■	■	■				■											■	■		■
Reactive	VARh				■	■	■	■	■	■	■	■															■	■		
Leading	VARh				■	■	■	■	■	■	■	■															■	■		
Lagging	VARh				■	■	■	■	■	■	■	■															■	■		
Power Quality																														
THD	%					■																								
Current THD	%											■															■	■		
Voltage THD	%											■															■	■		
Frequency	Hz	■	■	■		■	■	■	■	■	■	■	■														■	■		
Waveform Capture	N/A				■	■	■									■				■							■	■		
Temperature																														
Ambient	C																													
Auxiliary	C																												■	■
Load Bearing	C																												■	■
Motor Bearing	C																												■	■
Winding	C																												■	■
Phase (L, C, R)	C																													
Terminal Block	C																													
Input Status																														
Number of Inputs																													2	2

2

Table 2.2-3. Web UI Device Parameters Displayed via Power Xpert Gateway (Continued)

	Units	Insulation Monitor	Motor Starters & VFDs						Transfer Switches			I/O						Third Party Devices										
		InsulGard	Accutrol 400	AF97	Advantage Starters	IT. S811	IT. Starters/OSNAP	SVX & MVX Drives	ATC-400	ACT-600	ACT-800	Digital Input Module	D77A-AI16	D77A-AI8	D77A-DI16	D77A-DI8	Universal RTD	SQD CM 3000 Series	SQD CM 4000 Series	SQD PM 710	SQD PM 850	PML 7350	PML 7550	PML 7650	GE 369 Motor Relay	GE 469 Motor Relay	ABB TPU 2000	Qualitrol 118
Voltage																												
Average	V	■	■					■										■	■		■	■	■	■				
Voltage (Line-Line)	V					■			■	■	■							■	■	■	■	■	■	■				
Voltage (Line-Neutral)	V																	■	■	■	■	■	■	■			■	
Current																												
Average	A	■	■			■	■	■										■	■	■		■	■	■	■	■		
Phase	A			■	■	■												■	■	■	■	■	■	■	■	■	■	■
Ground	A																	■	■						■	■		
Neutral	A																	■	■	■								
Peak	A																	■		■	■							
Demand	A																	■										
Power																												
Apparent	VA		■															■	■	■	■	■	■	■			■	
Reactive	Var																	■	■	■	■	■	■	■			■	
Real	W																	■	■	■	■	■	■	■			■	
Power Factor																												
Apparent	PF																	■	■	■	■	■	■	■			■	
Displacement	PF																	■	■	■								
Energy																												
Real	Wh																	■	■	■	■	■					■	
Forward	Wh																	■	■		■	■	■	■				
Reverse	Wh																	■	■		■	■	■	■				
Apparent	Vah																	■	■	■	■	■	■	■				
Reactive	VARh																	■	■	■	■	■						
Leading	VARh																	■	■		■	■	■	■				
Lagging	VARh																	■	■		■	■	■	■				
Power Quality																												
THD	%																				■							
Current THD	%																											
Voltage THD	%																											
Frequency	Hz	■	■					■	■	■	■							■	■	■	■	■	■	■				
Waveform Capture	N/A																											
Temperature																												
Ambient	C	■						■																				
Auxiliary	C																■											
Load Bearing	C																■							■	■			
Motor Bearing	C																■							■	■			
Winding	C																■							■	■			
Phase (L, C, R)	C																											■
Terminal Block	C																											■
Input Status																												
Number of Inputs												8	16	8	16	8												

Note: Information subject to change without notice. Visit www.eaton.com for latest information.

Power Xpert Gateway — Dimensions in Inches (mm)

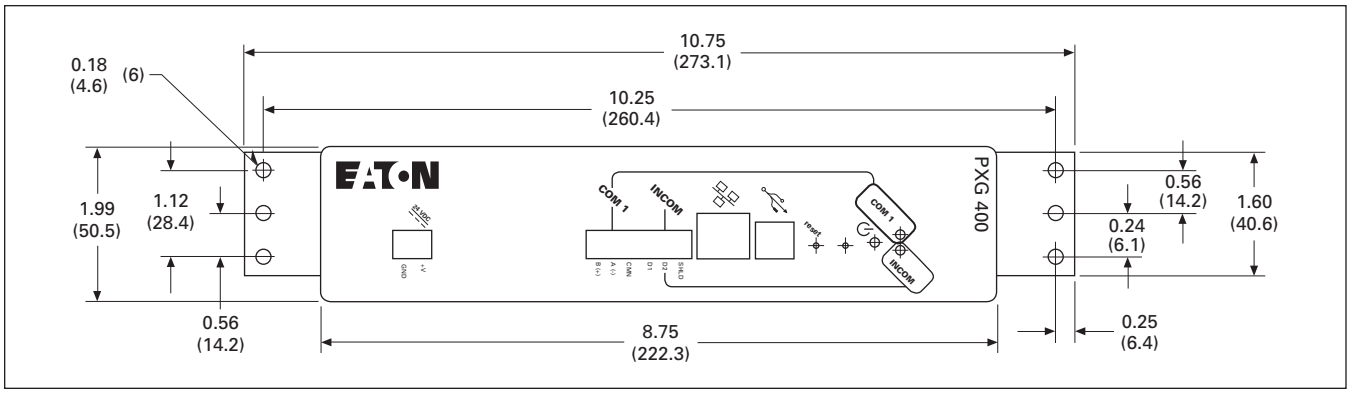


Figure 2.2-3. Power Xpert Gateway 400/600 with Standard Panel Mounting (Brackets Included)

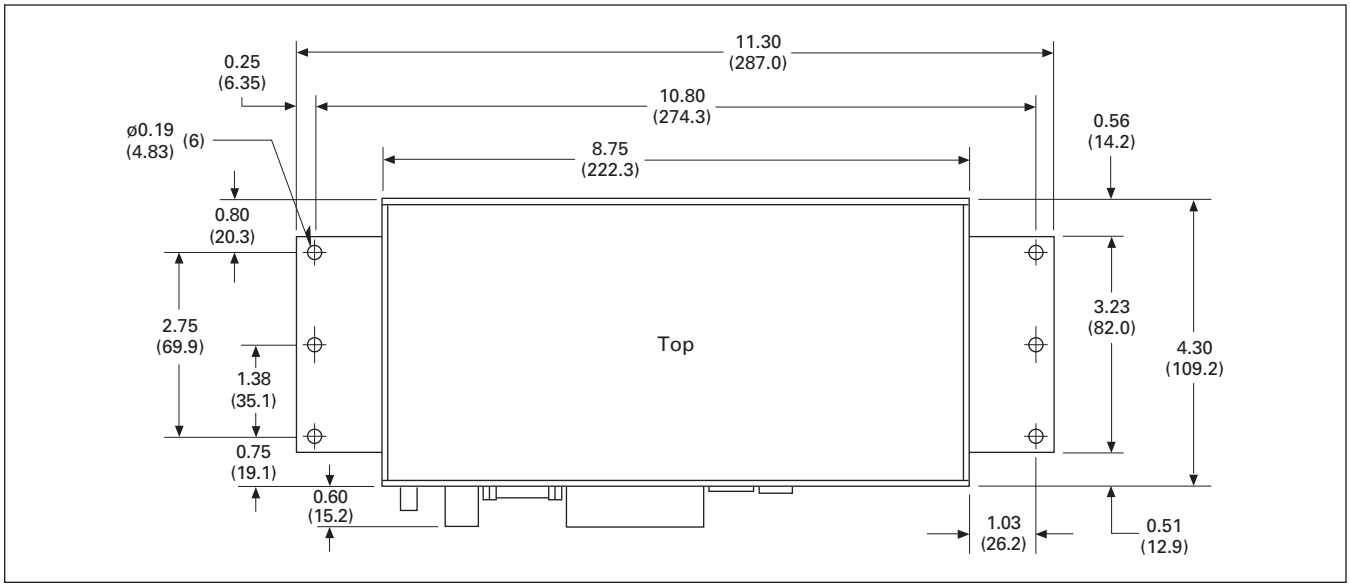


Figure 2.2-4. Power Xpert Gateway 400/600 with Low Profile Mounting (Optional Bracket Kit Available)

Technical Specifications

Table 2.2-4. PXG Part Numbers

Description	Style Number	Catalog Number
Power Xpert Gateway 400	66D2145G01	**PXG400**
Power Xpert Gateway 600	66D2146G01	**PXG600**
Power Supply — 24 Vdc	ELC-PS02	**ELC-PS02**
Low Profile Mounting Bracket Kit	66B2146G01	**PXGACC01**

Memory
- Flash: 128 MB
- RAM: 64 MB

Communication Ports
- Network Port: one 10/100Base-T RJ-45 connector
- Configuration Port: one USB port
- Serial Ports PXG 400
  - One dedicated RS-485 port for connection to INCOM devices
  - One RS-485 port for connection to either QCPort or Modbus RTU devices
- Serial Ports PXG 600
  - One dedicated RS-485 port for connection to INCOM devices
  - One RS-485 port for connection to either QCPort or Modbus RTU devices
  - One RS-485 or RS-232 (software selectable) port for connection to either QCPort or Modbus RTU devices

Network Protocols Supported
- Modbus TCP/IP: Supports data access from Modbus TCP clients
- Web Server: Supports data access from Web browsers (HTTP and HTTPS)
- DHCP: Supports automatic IP address assignments, if enabled
- SNMP: Supports common network management tools
- NTP: Supports time synchronization via a network time server for PXG synchronization
- SMTP: Supports mail server for e-mail notification

Serial Protocols Supported
- INCOM
- QCPort
- Modbus RTU

Supported Devices
Refer to **www.eaton.com/powerxpert** for most current list. Call for information on additional devices.

Web Browsers Recommended
- IE 6.0
- Mozilla Firefox 2.0

Number of Devices Supported
- PXG 400
  - 64 Total with INCOM Port + COM 1 Port not to exceed 64. Port limitations are as follows:
    - INCOM Port: Up to 64 INCOM devices
    - COM 1 Port: Up to 32 QCPort or Modbus RTU devices
- PXG 600
  - 96 Total with INCOM Port + COM 1 Port + COM 2 PORT not to exceed 96. Port limitations are as follows:
    - INCOM Port: Up to 64 INCOM devices
    - COM 1 Port: Up to 32 QCPort or Modbus RTU devices
    - COM 2 Port: Up to 32 QCPort or Modbus RTU devices

Power Input
- Input voltage, nominal: 24 Vdc; 0.8 A
- Input voltage range: +/- 20% Nominal

Power Consumption
- 8 watts maximum

Operating Temperature
- 32 to 140°F (0 to 60°C)

Ambient Storage Temperature
- -40 to 185° F (-40 to 85° C)

Relative Humidity
- 5 to 95% non-condensing at 50° C

Size (H x D x L) in Inches (mm)
- 2.1 x 4.5 x 8.9 (53.3 x 114.3 x 226.1)

Weight
- 1.5 pounds

Regulatory and Standards Compliance
- UL® 508, Standard for Programmable Controller Equipment.
- FCC, Class A, Part 15, Subpart B, Sections 15.107b & 15.109b.
- EN55022: 1994 Class A, Information Technology Equipment.
- EN 61000-6-2:2001 Electromagnetic Compatibility (EMC) Party 6-2: Immunity for Industrial Environments.

Note: Features and specifications listed in this document are subject to change without notice and represent the maximum capabilities of the product with all options installed. Although every attempt has been made to ensure the accuracy of information contained within, Eaton makes no representation about the completeness, correctness or accuracy and assumes no responsibility for any errors or omissions. Features and functionality may vary depending on selected options.

General Wiring Guidelines — RS-485 Network

Table 2.2-5. RS-485 Wiring Guide — Three Terminal Devices

Device Name	A (– Wire)	B (+ Wire)	Common Wire	XCVR Common ①	Data Bias
IQ230M	12 (MOD2)	11 (MOD1)	10 (INCOM 3)	I 26V	None
IQ250	(–) Older Models are Marked B (-)	(+) Older Models are Marked A (-) or A(+)	SH	I	None
IQ260	(–) Older Models are Marked B (-)	(+) Older Models are Marked A (-) or A (+)	SH	I	None
IQ330M	12 (MOD2)	11 (MOD1)	10 (INCOM 3)	I 26V	None
NETLINK	1 (DATA–)	2 (DATA+)	5 (GND)	E	None
InsulGard ②	B	A	None	Floating	None
Bushing Gard ② (InsulGard G3 ②)	B	A	None	Floating	None
Power Xpert Meter 4000/6000/8000	Data A 750B-S	Data B 750B-S	Shield (COM)	I 300V	750 Ohm Switch Sel
Power Xpert Gateway 400//600	A(–)	B(+)	COM	I	—

① Transceiver (XCVR) Common Connected to:
I = Isolated
NI = Non Isolated
E = Earth Ground

② Center terminal on Insulgard (marked with Ground symbol) is for shield splicing only and is electrically floating.

When communicating over RS-485 networks to Eaton products, the following General Wiring Guidelines should be used.

Rule 1: Cable Selection — Twisted Shielded Pair (TSP)

Note cables specifically designed for RS-485 applications are highly recommended. The RS-485 bus is a length of Twisted Shielded Pair (TSP) that includes a third conductor (used for the Common Wire), a braided shield accompanied by a Drain Wire, and nominal impedance of 120 ohms.

- Belden Wire and Cable Company Part Number 3106A or equivalent.

Rule 2: Cable Intermixing

Any cable in the Belden 3106A family can be intermixed with each other in the Modbus network.

Rule 3: System Topology, Size and Capacity

- Strict daisy chain must be adhered to. A strict daisy chain configuration is one where the transmission line connects from one RS-485 receiver to the next. The transmission line appears as one continuous line to the RS-485 driver.
- Maximum 32 devices.
- Line termination: Maximum cable lengths of 4,000 feet (1,219 m); Longer bus lengths will slow the data rate.

Rule 4: Cable Splicing

The prime goal is to create a secure electrical connection while minimizing exposure to electrical transients. Ferrules are used to dress cable ends. Most devices have built-in terminal blocks which can be used for splicing. Additionally, terminal blocks should be utilized when splicing elsewhere in the gear or facility to ensure a secure electrical connection.

Rule 5: Cable Shielding

The cable shielding and outer jacket should not be stripped back beyond 1-1/2 inches. 3-pole terminal blocks are used to ensure a continuous metallic shield ground path. To ensure a secure electrical connection when daisy chaining devices that have built-in 2-pole terminal blocks, mechanically crimp sleeves onto the two shield path drain wires.

Rule 6: Cable Grounding

Ground the communication network at only one point in the network, preferably by terminating the drain wire to ground at the EOL node (same location as the EOLR). A solid earth ground is accomplished by connecting the shield ground path's drain wire to a #14 AWG or larger multi-stranded wire that has an impedance path of 1 ohm or less to a known earth ground.

Note: The building electrical ground may not be effective since it may travel through many connections and considerable distances before reaching earth ground. In such cases a new ground path will be required since the effectiveness of this shield earth ground connection will affect the integrity of data transferred over the cable.

Rule 7: Cable Termination

End of Line Resistors (EOLR) are necessary to maintain signal strength and minimize reflections. EOLR must match the impedance of the TSP. Two EOLR are needed and should be located at both ends of the RS-485 bus. If there is only one device connected to the Modbus master, it is considered the last device in the network and should be terminated with a 120 ohm 1/4 watt terminating resistor.

Rule 8: Device Addressing

- Each device must have a unique slave address.
- No two devices on the same RS-485 network can have the same slave address.

Ethernet Cable Specifications

For complete specifications, refer to the IEEE 802.3 Ethernet specification.

INCOM Network

INCOM was specifically designed with the intention of delivering a comprehensive and powerful energy management solution for use in electrical distribution environments while ensuring affordability, flexibility, simplicity and noise immunity. An INCOM network installed per the following rules will allow the user to fully realize all of the above advantages. (Refer to Eaton document TD17513 for specific system layout recommendations and details.)

Rule 1: Cable Selection — Twisted Shielded Pair

Approved cable types:

- Any of the cables in the Belden 9463 family.
- Quabbin 6205.
- CommScope 9022.
- Manhattan Electric M4154.
- IMPCABLE — a 600V rated cable custom designed for INCOM — Style # 2A95705G01.

Rule 2: Cable Intermixing

Due to impedance differences between IMPCABLE and the Belden 9463 family, the main cable run(s) should be entirely for the 9463 family OR IMPCABLE: do not alternate between these types. The cable used for taps can be different from the main run.

Rule 3: System Topology, Size and Capacity

Supports Daisy Chain, Star, and Multi-Level Network Segment Topologies. (Note: Star Segment Topology is not recommended for new designs). See **Figure 2.2-6**. Surge protection is required for FSK networks that leave a building at the egress/ingress of the building.

- Supports distances up to 10,000 ft (3048 m) per segment when designed within the specifications of this guideline.
- Supports up to 1000 devices on a single network segment.
- Supports sub-network master devices and associated sub-networks.
- Supports 1200 or 9600 baud rate.
- Attenuation:
  - Total system capacity: 25 dB
  - Attenuation per device: 0.01 dB
  - Attenuation for approved wire types (see **Tables 2.2-6** and **2.2-7**)

Table 2.2-6. Cable Attenuation

Cable Type	Attenuation/ 1,000 Feet (305 m)
IMPCABLE	1.6 dB
Belden 9463 family	2.0 dB

Table 2.2-7. Attenuation at Star

Number of Long Lines	Attenuation
3	3.5 dB
4	6 dB
5	8 dB

- Definitions:
  - **Daisy chain**: point-to-point wiring between devices or clusters of devices
  - **Star**: single point with a number of long lines emanating from it
  - **Long line**: >200-foot (61 m) wire run
  - **Simple tap**: <200-foot (61 m) connection to cluster of devices

Rule 4: Cable Splicing

The goal is to create a secure electrical connection while minimizing exposure to electrical transients. Ferrules are used to dress cable ends in order to avoid problems associated with frayed and loose wires. Besides facilitating cable installation, subsequent data line troubleshooting and downtime are minimized. Most INCOM devices have built in three pole terminal blocks for data lines and shield. For older INCOM devices that have only two terminals, shield continuity must be ensured by other means. Additional terminal strips should be utilized when splicing elsewhere in the electrical enclosure or facility to ensure secure electrical connections. All devices, End of Line Termination Resistors, and Taps should be wired in parallel across the cable.

Rule 5: Cable Shielding

The cable shielding and outer jacket should not be stripped back beyond 1.5 inches (38 mm). Terminal blocks are used at tap points to ensure a continuous metallic shield ground path. To ensure a secure electrical connection when daisy-chaining INCOM devices that have built-in two pole terminal blocks, use crimp sleeves to join the two shield drain wires. The cable shield ground path for a Main Network and Sub-Network must not be joined. Each should have a separate connection to earth ground reference.

Rule 6: Cable Grounding

The shield should be continuous across a network segment and connected to the building's electrical system grounding electrode conductor. The 2005 NEC provides the following guidance on grounding communication cables:

1. When a communication cable enters a building, a primary protector is required and must be grounded as described in section 800 IV. Specifically, paragraphs 800.93 & 800.100 define grounding requirements for the primary protector.
2. Grounding systems are generally covered by Section 250 III. The grounding electrode conductor is specifically covered by paragraphs 250.62, 250.64, 250.66, 250.68 and 250.70.
3. Bonding requirements between communication systems and the power distribution system is specified by Paragraph 250.94.

A solid earth ground is accomplished by connecting the shield ground path's drain wire to a #14 AWG or larger multi-stranded wire that has an impedance path of 1 ohm or less to the building's grounding electrode conductor.

Rule 7: Cable Termination

Each network segment requires a minimum of two End of Line Termination Resistors (EOLTRs). The EOLTRs maintain signal strength and minimize reflections. The EOLTRs should be 1/2 watt 100 ohm non-inductive resistors, such as carbon composition or metal film. Wire-wound resistors are not acceptable. Taps on network segments should not be terminated. Some INCOM devices have the EOLTR permanently installed and must be located at the end of a main run. Other INCOM devices have an EOLTR that can be switched to optionally terminate the network segment at the device. Care must be exercised when installing devices containing termination resistors that the switches are set appropriately. A minimum of two, up to a maximum of five EOLTRs must be installed on each network segment as dictated by network topology.

Rule 8: Device Address

In order to avoid the possibility of devices in a Main Network having the same addresses as those in Subnetworks, set Main Network device addresses at 100 or higher excluding addresses 901 to 908.

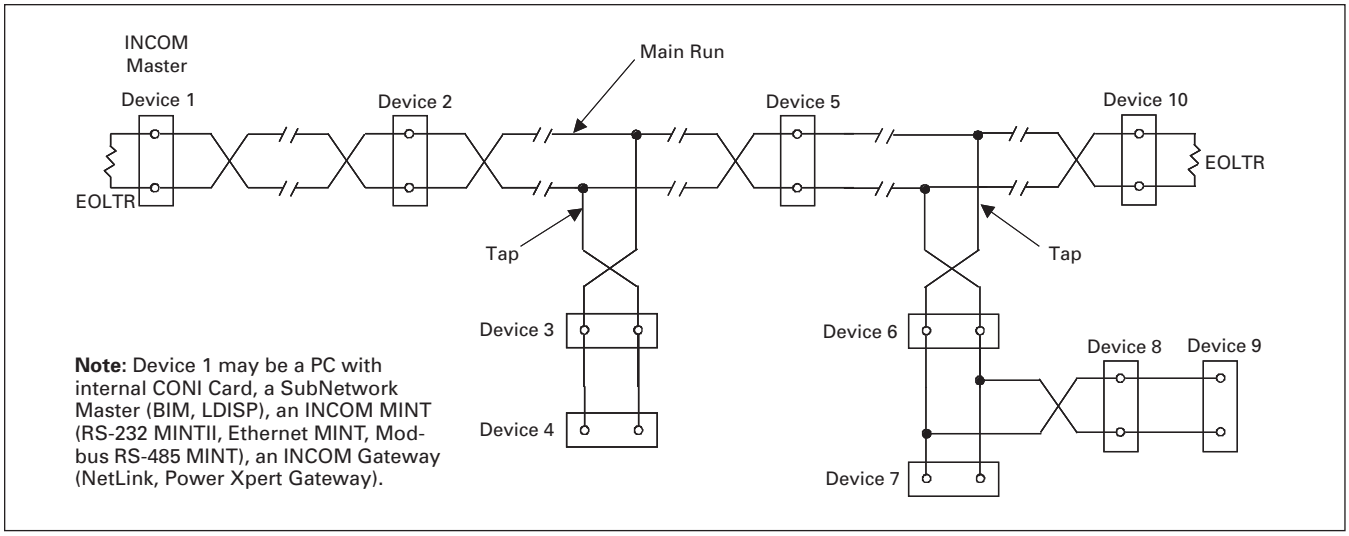


Figure 2.2-5. Daisy Chain Segment Topology

2

Ethernet-Enabled Power Quality & Energy (PQ&E) — IQ Meters

IQ Digital Panel Meters

General Description

Up to 64 PQ&E IQ INCOM Meters may be connected to a single PXG400/600 gateway and deployed in various power distribution and motor control applications. The meter information is made accessible to an Ethernet network for various communication applications including a standard web browser. The PXG600 offers an additional two ports for Modbus RTU over RS-485.

Note: The total device count on a PXG600 cannot exceed 96 devices.

Equipment

- IQ250/260 Meters — Modbus RS-485
- IQ220/230 Meters — INCOM
- IQ320/330 Meters — INCOM
- IQDP4000/4100 Meters — INCOM
- IQ6400/6600 Meters — INCOM
- IQ Energy Sentinel/Power Sentinel Meters — INCOM
- IQ Central Energy Display II — INCOM

Options

- PXG400 — Up to 64 IQ meters may be connected for Web Browser access and INCOM translation for Power Xpert Software.
- PXG600 — Up to 96 IQ meters may be connected for Web Browser access, data logging, alarm notification, control commands, and INCOM translation for Power Xpert Software.

Note: Both PXG400/600 support a maximum of 64 INCOM devices while not to exceed the total PXG device limit.
PXG400 — 64 Total
PXG600 — 96 Total

Communication Interfaces

- Modbus RTU (RS-485) or INCOM (downstream)
- Modbus TCP/IP (with PXG400/600)
- HTTP (with PXG400/600)
- XML/SOAP (with PXG400/600)
- SMTP (with PXG600)
- SNMP (with PXG600)

Metering/Monitoring Applications

- Real-time viewing of power/energy readings (PXG400/600)
- View trended power/energy readings (PXG600)
- User-defined events (PXG600)
- E-mail notification (PXG600)

Installation Applications

- Low Voltage Switchgear
- Medium Voltage Switchgear
- Low Voltage Motor Control Centers
- Medium Voltage Motor Starters

Communications Applications

- Building Management System (BMS)
- Energy Management Systems
- Network Management Systems (NMS)
- HMI
- Power Xpert Server Core Software
- Power Xpert Foreseer Class Software

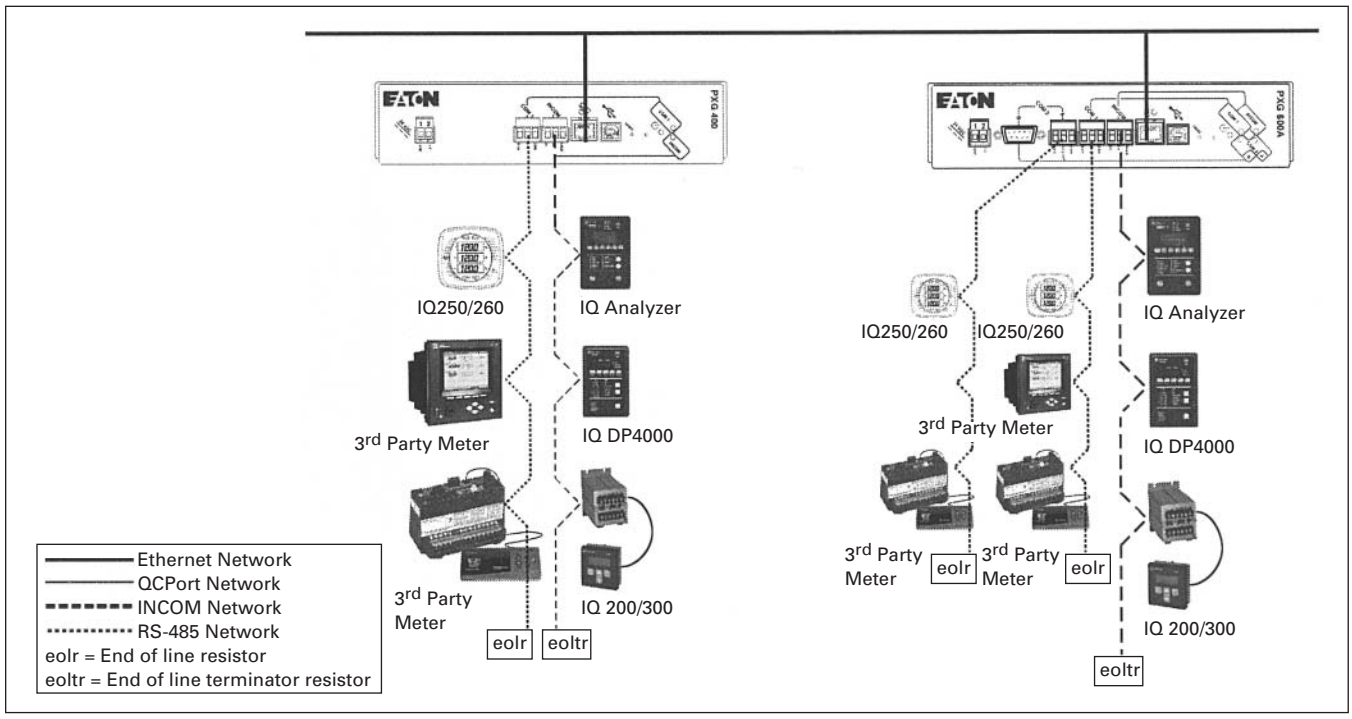


Figure 2.2-6. PXG400/600 Ethernet-Enabled IQ Meter Applications

Ethernet-Enabled Circuit Breaker Trip Units and Protective Relays

Electronic Trip Units

General Description

Up to a combination of 64 INCOM trip units and protective relays may be connected to a single PXG400/600 and deployed in various power distribution and motor control applications and made accessible to an Ethernet network using the PXG600.

Equipment

- Digitrip 3000/3200
- FP-4000/5000
- MP-3000/4000
- Digitrip 520MC
- IQ 500
- MPCV Relay
- Digitrip 1150/DT1150V
- Digitrip 810/910
- Digitrip MV
- Digitrip OPTIM 1050/750/550
- BIM II (Breaker Interface Module)

Options

- PXG400 — Up to 64 IQ meters may be connected for Web Browser access and INCOM translation for Power Xpert Software.
- PXG600 — Up to 96 IQ meters may be connected for Web Browser access, data logging, alarm notification, control commands, and INCOM translation for Power Xpert Software.

Note: Both PXG400/600 support a maximum of 64 INCOM devices while not to exceed the total PXG device limit.
PXG400 — 64 Total
PXG600 — 96 Total

Communication Interfaces

- Modbus RTU (RS-485) or INCOM downstream
- Modbus TCP/IP (with PXG400/600)
- HTTP (with PXG400/600) (with ECC)
- SMTP (with PXG600)
- SNMP (with PXG600)
- XML/SOAP (with PXG400/600)

Metering/Monitoring Applications

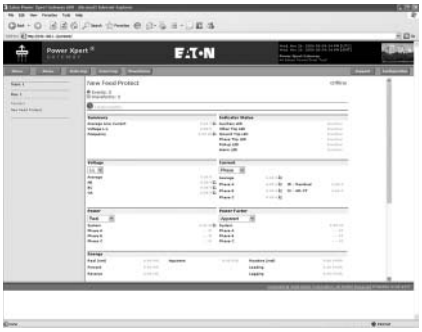
- Real-time viewing of power/energy readings (PXG400/600)
- View trended power/energy readings (PXG600)
- User-defined events (PXG600)
- E-mail notification (PXG600)

Installation Applications

- Low Voltage Switchgear
- Medium Voltage Switchgear
- Low Voltage Motor Control Centers
- Medium Voltage Motor Starters

Communications Applications

- Building Management System (BMS)
- HMI
- Energy Management Systems
- Network Management Systems (NMS)
- Power Xpert Server Core Software
- Power Xpert Foreseer Class Software



Viewing an Eaton FP-5000 Protective Relay through the Power Xpert Gateway

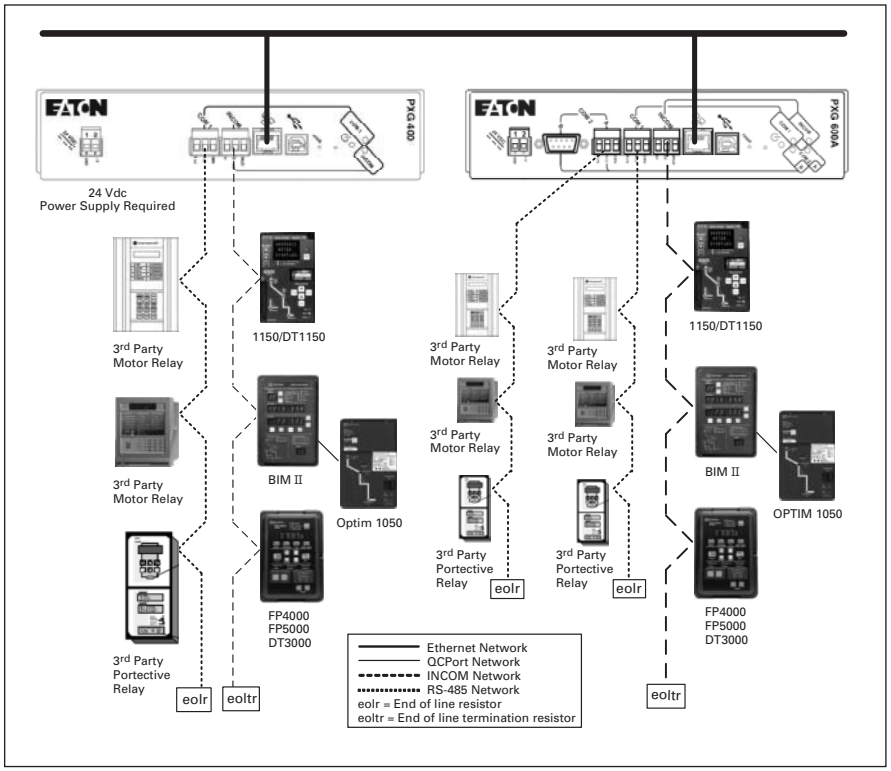
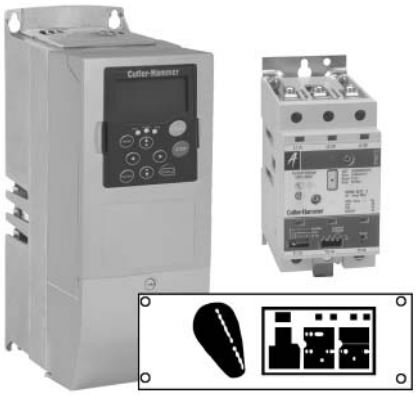


Figure 2.2-7. Power Xpert Gateway PXG400/600 Trip Unit and Relay Application

Note: When using Modbus RTU over an RS-485 communications network, the data rate, data protocol (data bit, stop bit and parity) and wiring topology (two-wire or four-wire) must be the same for each of the devices.

2

Ethernet-Enabled MCC



Electronic Motor Starters and Variable Frequency Drives

General Description

IT Cover Controls, Advantage Starters and Eaton Variable Frequency Drives may be connected to a single Power Xpert Gateway 400 (not to exceed 64 total) or Power Xpert Gateway 600 (not to exceed 96 total) deployed in various low-voltage motor control center applications and made accessible to an Ethernet network.

Equipment

- *IT* Starter
- *IT* Starter with QSNAP
- S811 (MV811) Soft Starter
- SVX9000/MVX9000 Variable Frequency Drives
- Advantage Starter
- Advantage ACM Starter

Options

- PXG400 — Up to 64 IQ meters may be connected for Web Browser access and INCOM translation for Power Xpert Software.
- PXG600 — Up to 96 IQ meters may be connected for Web Browser access, data logging, alarm notification, control commands and INCOM translation for Power Xpert Software.

Note: Both PXG400/600 support a maximum of 64 INCOM devices while not to exceed the total PXG device limit.
PXG400 – 64 total
PXG600 – 96 total

Communication Interfaces

- Modbus RTU (RS-485) or INCOM (FSK)
- Modbus TCP/IP (with PXG400/600)
- HTTP (with PXG400/600)
- XML/SOAP (with PXG400/600)
- SMTP (with PXG600)
- SNMP (with PXG600)

Metering/Monitoring Applications

- Real-time viewing of power/energy readings (PXG400/600)
- View trended power/energy readings (PXG600)
- User-defined events (PXG600)
- E-mail notification (PXG600)

Installation Applications

- Low Voltage Switchgear
- Medium Voltage Switchgear
- Low Voltage Motor Control Centers
- Medium Voltage Motor Starters

Communications Applications

- Building Management System (BMS)
- Energy Management Systems
- Network Management Systems (NMS)
- HMI
- Power Xpert Server Core Software
- Power Xpert Foreseer Class Software

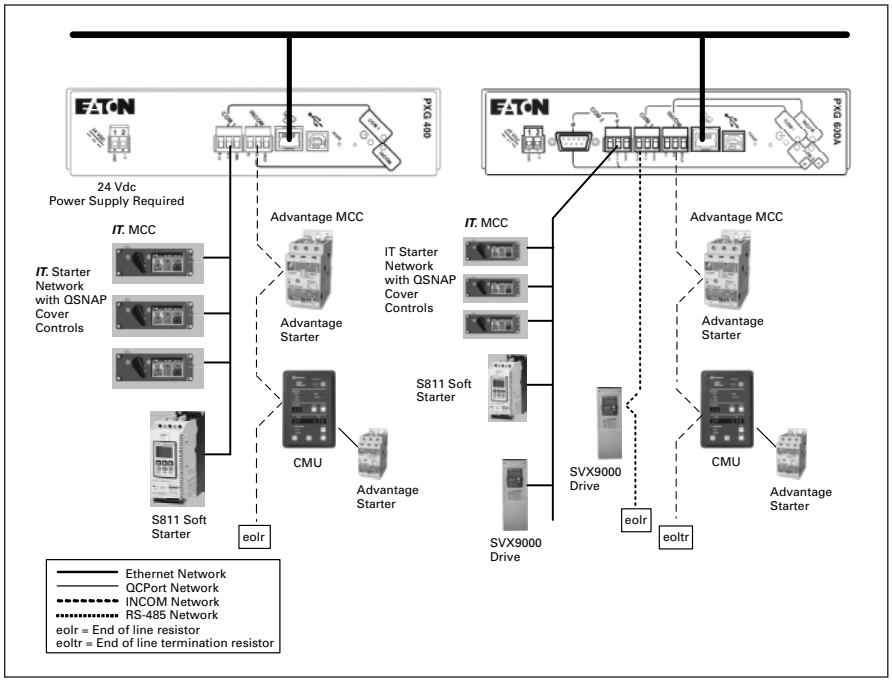


Figure 2.2-8. Ethernet-Enabled MCC Trip Unit and Relay Application

IPONI Communication Modules

Metered Parameters/ Communications

An IPONI enables communication of the metered parameters and set points consistent with those of the device to which it is attached.

Physical Characteristics

Each IPONI attaches to its associated product. No other mounting or enclosure is required. When mounted to the back of the meter or relay or other communicating device, the IPONI gets its power from the device to which it is attached. The connection to the device is via a 9-Pin connector.

Certifications/Listings

- **IPONI:** UL/cUL®

Communications

The IPONI enables communications over a twisted shielded pair INCOM device network. Wiring communications to these devices adhere to the Wiring Guidelines (see **Pages 2.2-9** and **2.2-11**).

IPONI Communication Module

Supported Devices

- IQ Analyzer (≥1.06)
- IQ DP-4000
- IQ Generator
- IQ Data
- IQ Transfer
- AEMII
- BIMII
- CMU
- CED
- MP-3000
- MP-4000

Catalog Information

Table 2.2-8. PONI Communication Modules

Description	Catalog Number
INCOM PONI	**IPONI**

Breaker Interface Module

Breaker Interface Module

General Description

Eaton's Cutler-Hammer Breaker Interface Module is a panel-mounted device which performs the following functions:

- Monitors and displays parameters (right) from any combination of Digitrip RMS 810, 910, Digitrip 1150 when set up to communicate as a 910 and Digitrip OPTIM Trip Units, Energy Sentinels and Power Sentinels, supporting as many as 50 of these devices up to 10,000 feet (3,048 m) away.
- Communicates the information from these protective and energy monitoring devices over a Cutler-Hammer INCOM network.
- Continuously monitors breaker's recording and time stamping trip events along with approximate fault currents. Events are logged into non-volatile RAM.

Parameters Displayed

- Phase current
- Energy
- Present demand watts
- Peak demand watts
- Average demand current
- Cause and magnitude of trip
- Trip history
- % Total Harmonic Distortion (THD) for each phase
- % Harmonic Content for each phase (1st – 27th harmonic)
- Custom circuit description

Note: The Breaker Interface Module displays only a portion of the information it receives from the Digitrip RMS 910 and Power Sentinels. The balance of the information (such as waveform analysis and power factor) can be passed through the unit to a master computer, where it can be viewed.

Communications

A PONI card can be easily field-mounted to the back of the Breaker Interface Module, enabling the unit to pass the information from its subnetwork to a remote master control unit up to 10,000 feet (3,048 m) away. No reprogramming of the unit is required when the IPONI is added.

The Breaker Interface Module can be mounted directly on the assembly or at a remote location and can be used to access, configure and display information from OPTIM Trip Units.

An operator can use the Breaker Interface Module to:

- Complete initial system setup:
  - ❑ Select system frequency (50/60 Hz)
  - ❑ Set password
- Configure the system:
  - ❑ Change time-current set points for Digitrip OPTIM breakers
  - ❑ Select protection options
  - ❑ Select alarm levels
- Display information:
  - ❑ Breaker information
  - ❑ Time-current set points
  - ❑ Metered values
  - ❑ Trip event information
- Test trip unit performance:
  - ❑ Phase and ground
  - ❑ Trip/no trip
- Expanded energy monitoring:
  - ❑ Set addresses for group energy monitoring
  - ❑ Group energy readings
- Local and remote indication:
  - ❑ Remote indication/alarming
  - ❑ Breaker status LED indication
- Expanded communications. Communicate with:
  - ❑ OPTIM Trip Units
  - ❑ Digitrip RMS 810 and 910 (1150 as 910) Trip Units
  - ❑ IQ Energy Sentinels
  - ❑ IQ Power Sentinel
  - ❑ A total of 50 devices

Password Protection

A user-defined password is included for added security when changing settings or performing breaker tests.

Non-Volatile Memory

The programmed functions, addresses and circuit descriptions are stored in non-volatile memory.

External Power

A 24 Vdc supply is required for the BIMII. (No external power supply is required for the PONI Card.) A 120 or 240 Vac supply is required for the BIMPS.

Rear Access Area

All wiring connections to the Breaker Interface Module are made at the chassis' rear and include:

- Relay connection for "alarm" condition, "high load" condition, "peak exceed" for device or group, and watthour pulse
- Initiator
- 24 Vdc input — BIMII
- 120 or 240 Vac input — BIMPS
- DIP switches for selecting an operating mode
- Three-contact connector with subnetwork
- Connector for PONI card for remote communications Local Display Units

Technical Data

Power Requirement

- 15 VA maximum

Input Voltage

- 24 Vdc ±5% — BIMII
- 120 or 240 Vac ±10% — BIMPS

Operating Temperature

- 0°C to 70°C (32°C to 158°F)

Humidity

- 5% to 95% R.H. (noncondensing)

Alarm Contact Ratings

- 10 A at 277 Vac (resistive)
- 10 A at 30 Vdc (resistive)
- 1/3 hp at 125, 250 Vac

Dimensions in Inches (mm)

- 6.72 H x 10.25 W x 2.60 D (170.7 H x 260.4 W x 66.0 D)
- 6.72 H x 10.25 W x 3.85 D (170.7 H x 260.4 W x 97.8 D) (with communications card)

Table 2.2-9. Catalog Information

Description	Catalog Number
Breaker Interface Module	**BIMII**

Power Management Systems Central Energy Display (CED)

Central Energy Display (CED)

General Description

The IQ Central Energy Display II (IQ CED II) can monitor and display the energy parameters of up to 50 IQ Energy Sentinels (see list on **Page 2.2-18**). The IQ CED II is a compact, panel-mounted device which provides a centralized alternative to individually mounted watt, watt-hour, and watt demand meters.

Programmable Alarms

The IQ CED II can be programmed to alarm for any of the following conditions:

- Peak demand exceeded user programmed maximum (individual or group)
- Device inactive or no response.

During set-up, the customer is given the option of deciding whether or not a security access code is needed to acknowledge and reset alarms. Alarms can also be acknowledged and reset over Cutler-Hammer PowerNet.

Communications

Communications between the IQ CED II and IQ Energy Sentinels is accomplished over a twisted pair of conductors on the highly reliable INCOM local area network. A subset of information equivalent to the IQ Energy Sentinel is displayed from power sentinels. All information is still available at a remote PC.

The IQ CED II communicates to its subnetwork at either 1200 or 9600 baud. Maximum total distance is 7500 feet.

The IQ CED II may be used to program the CT ratio settings of Universal mount IQ Energy Sentinels for external CTs.

The IQ CED II can communicate to its subnetwork at up to 9600 baud. The subnetwork of up to 50 IQ Energy or Power Sentinels may extend up to 7500 feet. This distance is not counted as part of the main network when tied back to a monitoring PC.

The remote communications option can be included at any time by mounting the PONI module to the IQ CED II. No reprogramming of the IQ CED II is required.

Self-Learning

The IQ CED II polls its subnetwork and stores the addresses of the IQ Energy Sentinels. This is done automatically after the unit is turned on for the first time, or may be operator invoked in the program mode.

A custom description for each device can be entered on the 8-digit alphanumeric window of the IQ CED II for easy location reference or downloaded through Cutler-Hammer PowerNet software.

Non-Volatile Memory

There is no need to reload after an ac power loss. The addresses, description of devices and desired alarming that are programmed in memory during the learn mode are retained throughout a power loss. Unless there has been a change in the local area network, it is not necessary to re-enter the learn mode. The real-time clock is battery backed. Once the time is set, there is no need to reload it, even if control power is lost.

User Friendly

- Operator panel (faceplate) is self-explanatory.
- A “HELP” function key scrolls explanations across the alphanumeric window.
- Self-learning.
- Minimal external connections (3 wires for ac input and 2 wires twisted pair for communications).

Flexible

- Programmable watt-hour pulse output for a (user defined) group of IQ Energy Sentinels.
- Can be mounted at a remote location to monitor one or more assemblies (up to 7500 feet away).
- Can be mounted directly onto assemblies.
- Remote communications option can be added at any time. No internal changes are required.
- Can interface with a variety of Cutler-Hammer PowerNet networks.

Application Description

Applications

- Display for up to 50 IQ Energy Sentinel and IQ Power Sentinels.
- Peak demand alarms.
- Watt-hour pulse initiator.
- Sync pulse input.
- Communication alarms.

Displayed Parameters

The following are displayed on the membrane NEMA® 3R, 12 faceplate:

- Energy – forward and reverse (watt-hours).
- Peak power demand.
- Power (watts).
- Present power demand.
- Group readings — able to sum the energy, present demand, and peak demand readings for up to 8 customer selected device groups.
- Status of device
  - ❑ Active
  - ❑ Inactive
  - ❑ No response
- Historical alarm log.
- User-programmed, custom description of each device.
- Data and time.

Communications

- Built-in communications to downstream IQ Sentinels.
- Accepts PONI for upstream communications to a remote computer.

Physical Characteristics

- Graphical, glass plasma display.
- Up to seven lines of information.
- Height: 10.25 inches.
- Width: 6.72 inches.
- Depth: 4.70 inches without PONI, 5.83 inches with PONI.
- Membrane faceplate NEMA 3R and 12 rated.

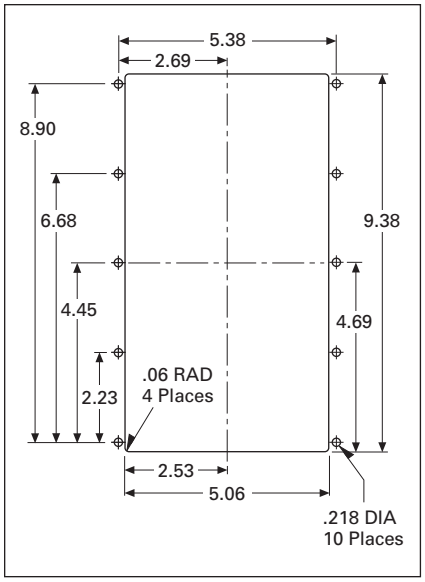


Figure 2.2-9. Drilling Pattern

Specifications

- Power Requirement: 10 VA maximum
- Input Voltage: 120 or 240 Vac (±20%) Auto selecting
- Frequency: 50 or 60 Hz
- Operating Temperature: 0° to 70°C (32° to 158°F)
- Storage Temperature: - 20° to 85°C (-40° to 185°F)
- Humidity: 5% to 95% R.H. non-condensing
- Alarm Contact Ratings
  - ❑ 10A at 277 Vac (resistive)
  - ❑ 10A at 30 Vdc (resistive)
  - ❑ 1/3 Hp 125, 250 Vac

Product Selection

Table 2.2-10. Ordering Information

Description	Catalog Number
IQ Central Energy Display II	**IQCEDII**

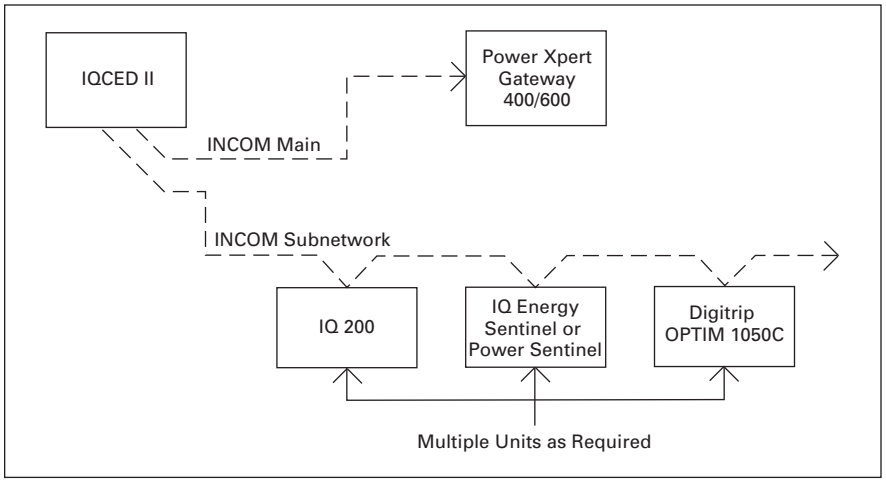


Figure 2.2-10. Typical Use Diagram of IQCED II

I/O Devices Digital Input Module (DIM)

Digital Input Module (DIM)

General Description

Eaton's Cutler-Hammer Digital Input Module is a device that inter-faces with up to four standard utility (electric, gas, water) meters or monitors eight digital inputs. It translates KYZ pulses from meters into a register count that is maintained and compiled within the DIM module in non-volatile memory. The pulse count can be accessed from the DIM module remotely using Cutler-Hammer Power Management Software including the Energy Billing application.

The DIM can also be used to monitor eight digital inputs from switch closures.

Application Description

- Reads four separate KYZ equipped utility meters.
- Pulse counts stored in non-volatile memory.
- Each channel independently monitors KYZ counts, pulse counts, or digital indications.
- Monitors a maximum of eight individual digital inputs.
- Input channels are isolated.
- Isolated 24 Vdc power is provided on the I/O connector.
- LED indicators on the input channels indicate when the unit is counting.

Physical Characteristics

- Height: 4.25 inches (107.9 mm)
- Width: 3.54 inches (89.9 mm)
- Depth: 3.50 inches (88.9) (does include DIN rail)
- 10 LED status indicators, 100 ohm termination DIP switch, address selector switches
- DIN rail mounting

Listings/Certification

- UL® 873
- CE mark (48 Vdc operation)
- FCC Part 15, Class A
- IEC 1000-4-x
- CISPR 22, Class A
- IEC 1000-4-2; 1995, Electro Static Discharge
- IEC 1000-4-3; 1995, Radiated RFImmunity.
- IEC 1000-4-6; 1996, Conducted RFImmunity
- FCC Part 15 Class A (10 meters) Radiated Emissions
- CISPR 22, Class A (30 meters); 1991, Radiated Emissions
- CISPR 22, Class A; 1991, Conducted Emissions (PowerPort)

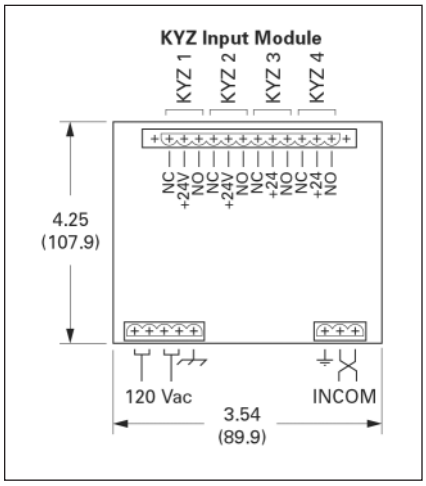


Figure 2.2-11. KYZ Input Module

Note: The Power Xpert Gateway 400/600 does not support KYZ pulses from the DIM unit.

Frequency Range

- 50/60 Hz

Power

- 85 to 138 Vac (120 Vac nominal) 50/60 Hz; 100 mA.
- 48 – 128 Vdc (48 Vdc nominal); 100 mA.
- Brownout operation at 50% and 80% of nominal ac and dc ratings.
- Power input is provided from a limited source, isolated from the mains by double isolation.
- Power for all inputs is supplied from an internal, isolated 24 Vdc power source.

Table 2.2-11. Specifications

Description	Rating
Operating Temperature	-20°C to 60°C
Storage Temperature	-20°C to 70°C
Operating Humidity	5 to 90% Maximum Noncondensing
Altitude	10,000 ft. (3,048 m)
Environment	Indoor Use Only
Transient Overvoltage	Category 2
Pollution	1°
Equipment	Class 1

Mounting Information

The DIM module is designed to be DIN rail mountable. DIN rail must be 1/3 inches H X 1-3/8 inches W (8.5 mm H x 34.9 mm W).

Communications

The DIM is a fully compatible Power Management Software communicating device with built-in INCOM™ communications. The DIM comes complete with a 3-pin connector to receive the shielded twisted pair conductor.

All wiring must be complete as per Instruction Leaflet TD17513, Wiring Specification Base Rules.

Table 2.2-12. Ordering Information

Catalog Number	Description
DIM	Digital Input Module

2

2

Addressable Relay II

Addressable Relay II

General Description

Eaton's Cutler-Hammer Addressable Relay II is designed for use where information or control of non-communicating devices is required remotely. The relays communicate INCOM Frequency Shift Key (FSK) on the Power Management Software system. Devices are assigned a 3-digit address to uniquely identify them on the daisy-chained twisted shielded pair network.

The Addressable Relay II is a Form C relay with output contact ratings as shown in the specifications table. The Addressable Relay II may be powered by 48 to 120 Vac or 48 to 125 Vdc through terminals 11 and 12 of the terminal block. dc polarity is not significant. The operating temperature range of the Addressable Relay II is 0°C to 70°C.

Each Addressable Relay II includes two status indicating circuits (IN1 and IN2) which can be used to transmit the contact status of devices external to the Addressable Relay II. A typical installation using these report-back inputs to the Power Management Software system is shown in the wiring example. Terminals 4 and 5 connect to the status input 1 circuit, and terminals 6 and 7 connect to the status input 2 circuit. These status indicating circuits operate with input voltages of 48 to 120 Vac or 48 to 125 Vdc circuits. The Addressable Relay II includes a feature called the "communications watchdog." The communications watchdog monitors communications between the Addressable Relay II and the computer control station. If communications are lost, the communications watchdog will reset the relay to the de-energized (OFF) state.

The Addressable Relay II must be updated every 10 seconds when the communications watchdog is enabled or else communications are assumed to be lost. The communications watchdog is enabled when DIP switch 3 is set to the ON position. When the communications watchdog is not enabled, the relay will remain in the state set by the last command issued. See **Figure 2.2-12** for DIP switch configuration.

Applications

- Enables remote control of non-communication capable devices on the Power Management Software system.
- Monitors two digital status inputs on the Power Management Software system.

Monitored Parameters

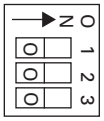
- Output relay energized/de-energized
- Input relay 1 status
- Input relay 2 status
- Breaker status open/closed
- Protective relay status normal/tripped

Communications

- Built-in INCOM communications for monitoring in a Power Management Software system.

Physical Characteristics

- Height: 3 inches (76.2 mm)
- Width: 1.75 inches (44.5 mm)
- Depth: 4 inches (101.6 mm)



	OFF	ON
Baud Rate	9600	1200
Relay Pulse	Disabled	Enabled
Communications Watchdog	Disabled	Enabled

Figure 2.2-12. DIP Switch Functions

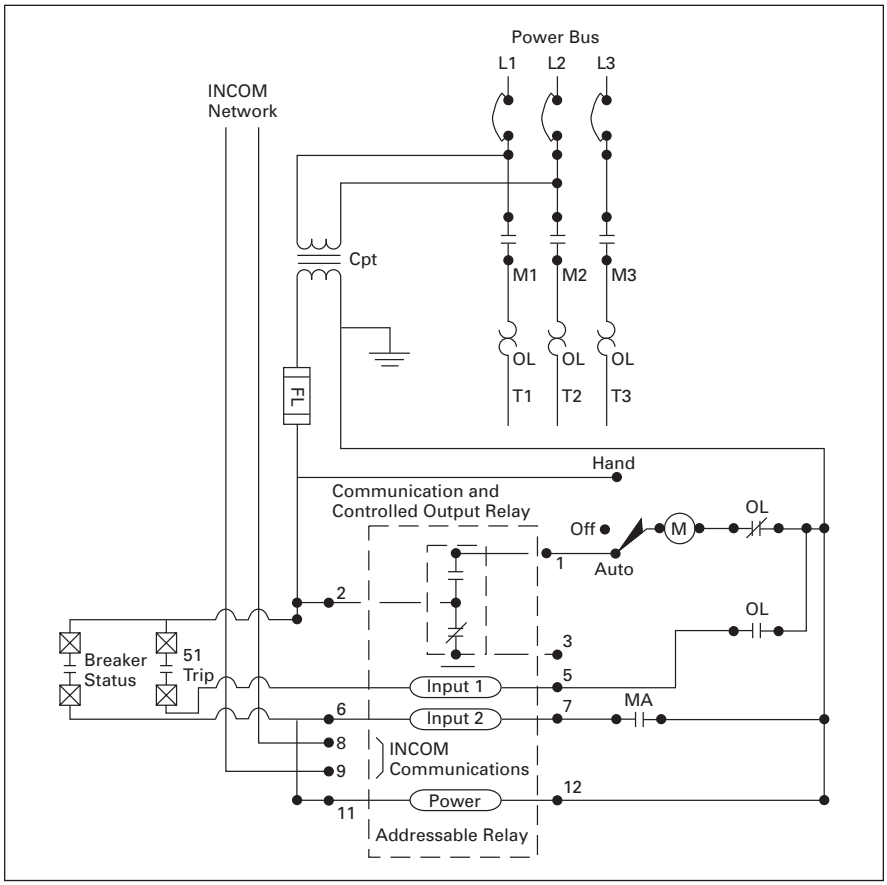


Figure 2.2-13. Typical Addressable Relay II Wiring Diagram

Note: The Power Xpert Gateway 400/600 does not support the Addressable Relay II.

Power Xpert Ethernet Switches

Convenient Network Expansion

General Description

Eaton's Power Xpert Ethernet Switches are ideal for extending Ethernet networks via CAT5 wiring or fiber in harsh, industrial environments. Built with high-grade components and constructed using special thermal techniques, PXE Switches can withstand the unpredictable conditions of such environments.

Features

- Simultaneous, full-duplex, high-speed communication on all ports — No network performance bottlenecks.
- Hardened for factory floor — Ideal for both industrial or data center applications.
- Unmanaged, plug-and-play implementation — No software or additional hardware required for configuration.
- Seamlessly integrates into Eaton's Power Xpert Architecture — Quality and reliability of Eaton guaranteed.
- Mounting options include stand-alone panel-mounting, DIN-rail mounting, or 19" standard rack mounting.

PXE 6-Port Switch — 10/100 Mb with Optional 100 Mb Fiber

This compact switch provides six Ethernet ports, with flexible configurations. The base models have one of three options:

- Two 100 Mb fiber and four 10/100 copper ports.
- One fiber and five copper ports.
- Six copper ports.

PXE 4-Port Switch — 10/100 Mb

For smaller applications requiring fewer connection points and no fiber, the 4-port Power Xpert Ethernet Switch is a versatile option. It provides edge access Ethernet ports in a convenient and compact package.

Technical Specifications

Table 2.3-1. Power Xpert Ethernet Switches

Description	Catalog Number
4 Port Ethernet Switch — Copper Only 6 Port Ethernet Switch — Copper Only	**PXES4P24V** **PXES6P24V**
6 Port Ethernet Switch — 5 Copper/1 Fiber (ST Connector) 6 Port Ethernet Switch — 4 Copper/2 Fiber (ST Connector)	**PXES6P24V1ST** **PXES6P24V2ST**

Table 2.3-2. Accessories

Description	Catalog Number
Power Supply (Preferred) — 100 – 240 Vac Input DIN-Rail Mount with Screw — 24 Vdc Output Terminals	**ELC-PS02**
Power Supply (Alternate) — 120 Vac Input Wall Plug-in Type with 6 ft. Cord — 12 Vdc Output	**PXESPS12V**
DIN-Rail Mounting Bracket	**PXESDINRL**
19" Rack Mount Tray	**PXESTRAY**

Table 2.3-3. Operating Environment

Description	Specifications
Ambient Temperature Ratings	-25°C to 60°C Long-Term per Independent Agency Tests (UL), or -40°C to 85°C Short-Term per IEC Type Tests
Storage Temperature	-40° to 185°F (-40°C to 85°C)
Cold Start	to -20°C
Ambient Relative Humidity	5% – 95% (Non-Condensing)
Altitude	-200 to 50,000 ft. (-60 to 15,000m)
MTBF	> 15 Years

Table 2.3-4. Network Standards

Description
Ethernet IEEE 802.3, IEEE 802.3u; IEEE 802.1p, 100Base-TX, 10Base-T, 100Base-FX

Table 2.3-5. Agency Approvals and Standards Compliance

Description
UL Listed (UL60950), cUL, CE, Emissions Meet FCC Part 15, Class A

Table 2.3-6. Power Consumption

Description
7.0 Watts Typical — 9 Watts Maximum

Table 2.3-7. Packaging

Description	Specifications
Enclosure	Robust Sheet Metal (Steel)
Dimensions of PXES4P Series Weight of PXES4P Series	3.5 in H x 3.0 in W x 1.0 in D (8.9 cm x 7.6 cm x 2.5 cm) 8.6 oz. (243g)
Dimensions of PXES6P Series Weight of PXES6P Series	3.6 in H x 3.0 in W x 1.7 in D (9.2 cm x 7.6 cm x 4.3 cm) 13 oz. (370g)
Cooling Method	Case Used as a Heat Sink

Table 2.3-8. Mounting

Description	Specifications
Metal Panel Mounting Clips	Included
DIN-Rail Mounting	Optional
19" Rack Mount	Optional

Note: These specifications are subject to change without notice and represent the maximum capabilities of the product with all options installed. This is not a complete feature list. Features and functionality may vary depending on selected options and product model. Please refer to the technical data sheet and User Manual for detailed specifications. Please see www.eaton.com/powerxpert for latest information.

Copper Ethernet Cable Wiring Guidelines

The following information can be used as a guide when designing an Ethernet system using Copper Ethernet Cable.

- Cables should not be routed near equipment that generates strong electric or magnetic fields such as motors, drive controllers, arc welders and conduit.
- Ethernet cable insulation has a voltage rating of 300 Vac. Use of barriers, cable trays or high voltage sheathing with STP Ethernet cable may be required in installations with cables carrying voltages greater than 300 Vac. This may also be necessary in order to comply with UL requirements. In installations where the cable cannot be physically separated from the power cables (where a physical barrier is not practical) fiber optic cable should be used.
- When crossing power conductors with Ethernet cable, cross at right angles.
- Shielded Twisted Pair (STP) Ethernet cable should be specified for use in high noise environments. Shielded shrouded connectors must be used and the shield must be connected at both ends of the wire. The mating plug must have a shielded shroud that is terminated to ground at both ends. Where there is a possibility of a difference in ground potential (common mode) voltages between the two terminated ends, fiber optic cable is recommended.
- When using conduit or a metal cable tray, each section of the conduit or tray must be bonded to each adjacent section and the conduit or tray needs to be bonded to earth ground. Do not allow the shields to touch the conduit or metal tray at any point.
- Only shielded (STP) Ethernet cables should be placed into metal conduit. Some UTP cables may not function properly when installed in conduit, as the metal conduit can affect the electrical properties of an unshielded cable. Consult the cable manufacturer when installing UTP cables in conduit.
- As a general rule for noise protection, Ethernet Cable should maintain a minimum distance of 3 inches (8 cm) from electric power conductors for up to 100 volts and 1 inch (3 cm) for each additional 100 volts up to 400 volts. STP cable is recommended.
- For Ethernet cable run within conduit but near conductors with potentially noisy power conductors carrying currents of greater than 20 A or voltages greater than 400 V, maintain the following distances. STP cable is required.
  - ❑ Conductors of less than 20 A = 3 inches
  - ❑ Conductors of 20 A or more and up to 100 kVA = 6 inches
  - ❑ Conductors greater than 100 kVA = 12 inches
- For Ethernet cable run near conductors with potentially noisy power conductors carrying currents of greater than 20 A or voltages greater than 400 V, maintain the following distances. STP cable is recommended.
  - ❑ Conductors of less than 20 A = 6 inches
  - ❑ Conductors of 20 A or more and up to 100 kVA = 12 inches
  - ❑ Conductors greater than 100 kVA = 24 inches
- Route Ethernet cable at least 5 feet (1.5 m) from sources of rf/microwave radiation. STP cable is required.
- Do not cascade more than 4 Ethernet repeaters (router, switch or hub) within a network segment.
- Environmentally sealed connectors should be specified for cables used in outdoor installations.
- Avoid pinching the cable when using cable ties.
- Total distance between an Ethernet Transmitter and Receiver at the end points of the network should not exceed 328 feet (100 m).
- Total distance from a patch panel to a wall jack (using solid cable) shall not exceed 295 feet (90 m). Splices are not permitted.
- Patch cords used as cross-connect jumpers in a patch panel should not exceed 20 feet (6 m).
- Patch cords from a wall jack to the work area PC (or device) shall not exceed 16 feet (5 m).
- Ethernet cable used in harsh environments must be selected to withstand the following conditions: vibration, air born contaminants, chemicals, temperature, electromagnetic interference, combustible atmospheres and local regulatory standards such as UL and NEMA.
- Ethernet connectors used in harsh environments must be robust enough to withstand vibration, multiple connection cycles, temperature changes, and provide a proper seal to protect against moisture, dust/dirt and chemical attack.
- Different cable media support different bandwidth capabilities. When installing cable in a network, care should be taken to install the cable that will fill current network loading requirements and future expansion needs. In general, fiber optic cable can support the greatest bandwidth (upwards of 25,000 gigabits) and UTP has the lowest. CAT5e cabling is designed to operate a bit rates up to 1000 Mb and CAT6 cable up to 2000 Mb.
- Operating your cable at maximum speed reduces the distance between network segments. Check with your cable supplier for specifications regarding segment distance vs. speed.
- Cable with 5% impedance mismatch or return loss of 27 to 32 dB is recommended. Ethernet cable impedance can vary by as much as 15% (85 to 115 Ohms). Average Ethernet cable with 15% impedance variation can have up to 10 dB additional return loss. This discontinuity is referred to as return loss, since it causes some of the signal to be reflected back down the cable instead of propagating forward. It is measured in decibels or ratio of transmitted versus reflected signal.

Fiber Optic Technology

The use of fiber optics in telecommunications and wide area networking has been common for many years, but more recently fiber optics have become increasingly prevalent in industrial data communications systems as well. High data rate capabilities, noise rejection and electrical isolation are just a few of the important characteristics that make fiber optic technology ideal for use in industrial and commercial systems.

Although often used for point-to-point connections, fiber optic links are being used to extend the distance limitations of RS-232, RS-422/485 and Ethernet systems while ensuring high data rates and minimizing electrical interference.

Conventional electrical data signals are converted into a modulated light beam, introduced into the fiber and transported via a very small diameter glass or plastic fiber to a receiver that converts the light back into electrical signals.

Optical fibers allow data signals to propagate through them by ensuring that the light signal enters the fiber at an angle greater than the critical angle of the interface between two types of glass. Optical fiber is actually made up of three parts. The center core is composed of very pure glass. Core dimensions are usually in the range of 50 to 125 um for multi-mode cables and 8-9 um for single-mode cables. The surrounding glass, called cladding, is a slightly less pure glass. The diameter of the core and cladding together is in the range of 125 to 440 um.

Surrounding the cladding is a protective layer of flexible silicone called the sheath.

Fiber Optic Cable Wiring Guidelines

The following information can be used as a guide when designing an Ethernet system using Fiber Optic Ethernet Cable:

- Select a fiber cable that is suited for the application, e.g., outdoor, aerial, duct, intra-building, risers, general building and plenum applications.
- Fiber optic cable is useful in applications where the environment is combustible, electrically noisy, the cable must be bundles with high voltage wires or where common mode voltages may exist between the earth ground points of the terminating connectors.
- Fiber optic cable is available in various operating temperature ranges. Care should be taken to match the temperature rating of the fiber to the environment it will be exposed to. The temperature specification for fiber may be narrower than copper cable. Consult the cable manufacturer for temperature specifications of your cable type.
- Sealed fiber connectors are available for use in harsh environments to prevent contamination from entering the connector and fiber. The type of seal required will be application dependant and can vary from dust- and moisture-proof to water-tight.
- Mixing fiber cable types is not permitted. The same core dimensions and mode must be used within cable segments.
- Care should be taken when purchasing connectors to include strain relief which reduces mechanical strain (vibration) within the cable, as well as the connector. Strain relief also provides support to the cable to ensure proper bend radius at the connector.
- Single-Mode Fiber is used for long distance transmission of up to 120 km. Distance may vary depending on speed and type of converter used.
- Multi-Mode Graded-Index Fiber Cable is used for communication over shorter distances of up to 2 km.
- Fiber cable is composed of glass and is not well suited for applications requiring tight bend radiuses. Cable radius dimensions vary per manufacturer. If the manufacturer does not provide a bend radius, a typical rule of thumb is a radius not less than 15x the cable diameter.
- Fiber cable to connector terminations can be performed in the field using special equipment. This method is not recommended.
  - Tier One testing is recommended when diagnosing system irregularities and should be performed in all new installations
  - Tier Two testing is recommended to certify that a system complies with standards set forth by the owner/installer

This page intentionally left blank.

Power Xpert Gateway Series 1000 Card — Power Distribution Unit

Power Xpert Gateway Series 1000 Card

General Description

The Power Xpert Gateway Series 1000 Card (PXGX 1000) provides Web-enabled, real-time monitoring of Powerware Power Distribution Units (PDUs), Rack Power Modules (RPM) and Powerware Remote Power Panels (RPPs) through standard on-board Web pages, Power Xpert software or third-party software.

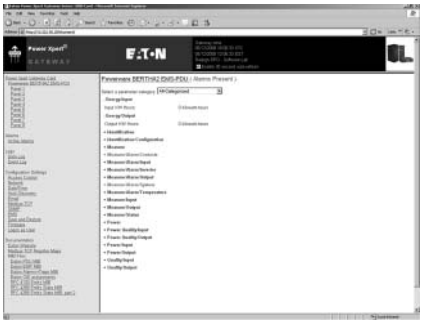
An integral part of the Power Xpert Architecture, which provides end-to-end PowerChain Management® solutions, the PXGX 1000 provides a central point to connect distribution products to an Ethernet network.

Information is presented in organized, user-friendly Web pages and include the following:

- PDU system identification
- Graphic panel layouts
- Voltage
- Current
- Frequency
- Energy
- Power
- THD (current and voltage)

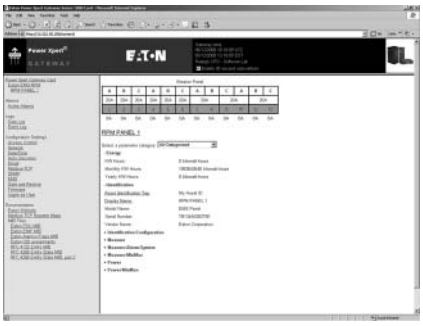
Features

- Web-enabled monitoring of power quality data down to the branch circuit level — Data can be viewed from any location with a Web browser.
- Configure and edit the EMS remotely via the Web interface — supports remote configuration, including naming, alarm and warning set points, and percentages.
- Data and event logging with time stamp — Accurate logging for power quality analysis.
- Modbus TCP/IP and SNMP Support — Open communication protocol facilitates integration with standard building management systems and network management systems.
- Customized email messaging for events notification, including data and event logs and periodic "heart-beat" emails — Direct alarm and event notification to the appropriate person(s) in the organization.
- Easy integration into existing Ethernet infrastructure — Minimize installation cost.
- Securely access and view information — password authentication is required at 2 levels. The card also supports secure Web-based communication via SSL.
- Generate Modbus Register Maps on the fly — All of the data specific to the system is immediately available and can be generated with one click of the mouse.
- Save and Restore settings — Configuring a large PDU with EMS can take time. Once the effort is complete, the configuration can be saved for later use. It also allows the user to duplicate panel identical configurations in minimal time.
- Supports the Environmental Monitoring Probe — Temperature, humidity and contact status can be viewed though the Web page.



PDU or RPP System Summary Page

PDU or RPP Panel Page



RPM Panel Page

Technical Specifications

Table 2.4-1. The Power Xpert Gateway Series 1000 Card Kit Includes

Power Xpert Gateway Series 1000 Card
Ethernet Cable
Local Configuration Cable
Quick Start Guide

Ordering Information

Catalog Number	PXGX 1000
Style Number	103005741-5591
Description	Power Xpert Gateway Series 1000 Card for use with Powerware PDUs/RPPs/RPMs

Devices Supported

Powerware Power Distribution Units with X-Slot® compatibility
Powerware Remote Power Panels with X-Slot compatibility
Powerware Rack Power Modules with X-Slot compatibility

Communication Ports

Ethernet Ports	Two independent RJ45 ports: supports 10/100Base-T for redundant network configurations
Serial Ports	One RJ45 console part: supports local configuration and optional connection to an Environmental Monitoring Probe (EMP)

Communication Protocols Supported

Web Server	Supports data access from Web browsers (HTTP and HTTPS)
Modbus TCP/IP	Supports data access from Modbus TCP clients
SNMP	Supports common network management tools
SMTP	Supports email notification
NTP	Supports time synchronization via an NTP server for card and PDU synchronization
DHCP	Supports automatic IP address assignments, if enabled

Supported MIBs

Eaton PDU MIB
Eaton EMP MIB
Eaton Alarms and Traps MIB
RFC 4133 Entity MIB
RFC 4268 Entity State MIB
RFC 4268 Entity State MIB Part II
RFC 1213 MIB II

Web Browsers Supported

IE
Mozilla Firefox

Physical Characteristics

Dimensions	12 cm x 11.4 cm x 3.9 cm (4.7" x 4.5" x 1.5")
Weight	200 grams (7.0 oz)

Environmental Specifications

Ambient Operating	0 to +40°C (32 to 104°F)
Relative Humidity	10 to 80%, non-condensing
Altitude	10,000 ft
Enclosure Rating	Indoor Use Only

Mounting Configuration

X-Slot form factor fits directly into PDU/RPP/RPM chassis

Power Supply

Nominal Input Voltage	12 Vdc, unregulated (provided by PDU/RPP)
Input Voltage Range	8 – 25 Vdc, unregulated

Power Consumption

2.0 Watts

Regulatory/Standards Compliance

FCC Part 15, Class A	
CISPR 22, Class A	
ROHS Compliant	
Telecom Conducted via EU Standard	EN 55022:1988+A1:2000+A2:2003, Class A/EN55022:1988+A1:2000+A2:2003

Note: Features and specifications listed in this document are subject to change without notice and represent the maximum capabilities of the software and products with all options installed. This is not a complete feature list. Features and functionality may vary depending on selected options.

Power Xpert Gateway Series 2000 Card — Uninterruptible Power Supplies

Power Xpert Gateway Series 2000 Card

General Description

The Power Xpert Gateway Series 2000 Card (PXGX 2000) provides Web-enabled, real-time monitoring of Powerware Uninterruptible Power Supplies (UPS) through standard on-board Web pages, Power Xpert software or third-party software.

An integral part of the Power Xpert Architecture, which provides end-to-end PowerChain Management solutions, the PXGX 2000 provides a central point to connect distribution products to an Ethernet network.

Information is presented in organized, user-friendly Web pages and include the following:

- UPS system identification
- Voltage
- Current
- Frequency
- Energy
- Output Power
- Power — full load %
- Battery information
  - History and maintenance
  - Run time remaining
  - Voltage
  - % battery left

Features

- Web-enabled monitoring of power quality data — Data can be viewed from any location with a Web browser.
- Data, event and system logging with time stamp — Accurate logging for power quality analysis.
- Modbus TCP/IP and SNMP Support — Open communication protocol facilitates integration with standard building management systems and network management systems.
- Intelligent email communications — Two options for alarm and event email notification, individual emails for each alarm or event, or collective notification, providing the same information with a drastically reduced number of emails.
- Easy integration into existing Ethernet infrastructure — Minimize installation cost.
- Securely access and view information — Password authentication is required at 2 levels. The card also supports secure Web-based communication via SSL.
- Generate Modbus Register Maps on the fly — All of the data specific to the UPS is immediately available and can be generated with one click of the mouse.
- Save and Restore settings — Once the configuration effort is complete, it can be saved for later use.
- Supports the Environmental Monitoring Probe — Temperature, humidity and contact status can be viewed through the Web page.
- Two independent, redundant Ethernet ports — Designed to support high reliability systems.

UPS Summary Page

Alarm Summary Page

NetWatch Support Page

Technical Specifications

Table 2.4-2. The Power Xpert Gateway Series 2000 Card Kit Includes

Power Xpert Gateway Series 2000 Card
Ethernet Cable
Local Configuration Cable
Quick Start Guide

Ordering Information

Catalog Number	PXGX 2000
Style Number	103005868-5591
Description	Power Xpert Gateway Series 2000 Card for use with Powerware UPSs

Devices Supported

Powerware uninterruptible power supplies with X-Slot ® compatibility; these include the Powerware 5115 RM, 5125, 9125, 9140, 9155, 9315, 9355, 9330, 9390, 9395, BladeUPS ®

Communication Ports

Ethernet Ports	Two independent RJ45 ports: supports 10/100Base-T for redundant network configurations
Serial Ports	One RJ45 console port: supports local configuration and optional connection to an Environmental Monitoring Probe (EMP)

Communication Protocols Supported

Web Server	Supports data access from Web browsers (HTTP and HTTPS)
Modbus TCP/IP	Supports data access from Modbus TCP clients
SNMP	Supports common network management tools
SMTP	Supports email notification
NTP	Supports time synchronization via an NTP server for card and UPS synchronization
DHCP	Supports automatic IP address assignments, if enabled

Supported MIBs

Eaton Power MIB
RFC 1628 UPS MIB
Eaton EMP MIB
Eaton alarms and traps MIB
RFC 4133 Entity MIB
RFC 4268 Entity State MIB; RFC 4268 Entity State MIB Part 2
RFC 1213 MIB II

Web Browsers Supported

IE
Mozilla Firefox

Physical Characteristics

Dimensions	12 cm x 11.4 cm x 3.9 cm (4.7″ x 4.5″ x 1.5″)
Weight	200 grams (7.0 oz)

Environmental Specifications

Ambient Operating	0 to +40°C (32 to 104°F)
Relative Humidity	10 to 80%, non-condensing
Altitude	10,000 ft
Enclosure Rating	Indoor use only

Mounting Configuration

X-Slot form factor fits directly into UPS chassis

Power Supply

Nominal Input Voltage	12 Vdc, unregulated (provided by UPS)
Input Voltage Range	8 – 25 Vdc, unregulated

Power Consumption

2.0 Watts

Regulatory/Standards Compliance

FCC Part 15, Class A	
CISPR 22, Class A	
ROHS Compliant	
Telecom Conducted via EU Standard	EN 55022:1988+A1:2000+A2:2003, Class A/EN55022:1988+A1:2000+A2:2003

Note: Features and specifications listed in this document are subject to change without notice and represent the maximum capabilities of the software and products with all options installed. This is not a complete feature list. Features and functionality may vary depending on selected options.

Power Xpert Software Server Core

General Description

Power Xpert Software, Server Core Class (Server Core) is the fusion of key components of our PowerNet and Powerware's PowerVision Software into a single power monitoring package which includes ease of interconnectivity to a wide range of Eaton and third-party communicating devices. Server Core provides an easy upgrade path to allow existing PowerNet users to enjoy the benefits of power monitoring through a simple Web browser interface.

Server Core provides a complete software solution to manage your power system. Critical components such as metering devices, protective relays, circuit breaker trip units, motor starters and uninterruptible power supplies communicate vital information about the health and status of critical infrastructure devices.

Features

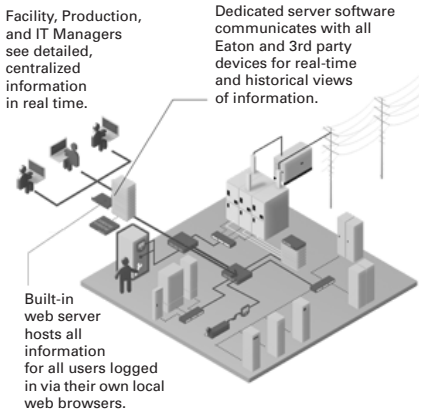
- Connects to your existing network.
- Data trending and graphing for detailed information for troubleshooting, problem prevention and costs savings.
- Web-based views that allow access to critical information from any location via a Web browser.
- A modular, scalable architecture that allows the addition of capabilities and devices as the power system expands.
- Alarm conditions bubble up through the system to allow personnel to identify which device is in alarm and where it is located.
- All the functionality of Eaton's PowerNet software suite as standard only on the Server Core DVD.

Viewing a Device in Server Core

Analyzing Power Quality

Electrical power quality is becoming ever more important with the continuing increase of nonlinear loads in industrial and commercial facilities. Voltage or frequency variances can disrupt many industrial processes, resulting in costly downtime and equipment losses. The Server Core provides historical profiles, or records of events for internal and utility verification, as well as realtime information that allows the user to isolate the source, magnitude, time and direction of power quality problems, including the following:

- **Voltage Disturbances**
  The most common power quality problem, voltage sags and swells, occurs because of utility supply variations, system faults or the concurrent starting of large motor loads.
- **Harmonics**
  Harmonic distortion appears on the distribution system because of variable frequency drives and other non-sinusoidal loads where ac/dc conversion is present (UPS systems, computer power supplies, etc.).
- **Power Factor**
  The ability to monitor power factor throughout the facility ensures delivery of power at optimal efficiency, allows 100% usage of transformers and prevents costly power factor penalties.


Facility, Production, and IT Managers see detailed, centralized information in real time.
Dedicated server software communicates with all Eaton and 3rd party devices for real-time and historical views of information.
Built-in web server hosts all information for all users logged in via their own local web browsers.

Power Xpert Software: Where It Fits in the Picture

Managing Power Costs

Power management is essential for an industrial or commercial facility. Electricity costs account for between 10 and 30% of total facility operating costs. Despite being often considered overhead, energy costs are manageable.

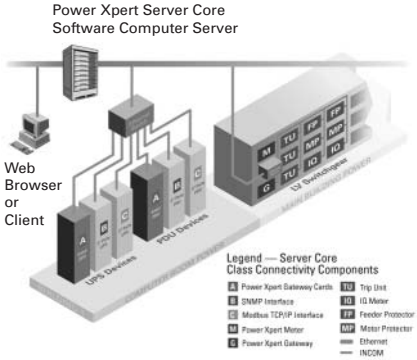
Manage When Energy is Used

Manage your energy costs by accurately measuring and quantifying energy patterns and usage within the facility.

- **Track Use Patterns**
  Efficiently schedule processes during non-peak usage times by being able to identify where and when energy is being consumed. Verify the effectiveness of energy reduction methods.
- **Purchase Energy**
  Make informed energy purchasing decisions by comparing how the rate structures offered by various suppliers impact your bottom-line.
- **Allocate Energy Costs**
  Establish accountability and enable incentives for energy conservation by accurately allocating usage and costs to each process or department.
- **Verify Bill**
  Confirm the accuracy of your energy bill using the detailed data supplied by Power Xpert Software Server Core.

Track and Schedule Maintenance

Coordination problems can be identified by overlaying coordination curves of active devices identifying problems before an unnecessary outage occurs. Maintenance schedules can be created on real-time mechanical and electrical equipment usage avoiding unnecessary preventive maintenance. Equipment benefiting from usage-based maintenance can have maintenance alarms initiated based on equipment lifetime deteriorators rather than simply time schedules.



Typical PXS Server Core System

Problem Avoidance and Troubleshooting

Operators receive alerts to potential problems before they occur, such as a breaker timing out to trip. Loads can be shed or switched to alternate sources to prevent critical upstream breakers from unnecessarily tripping on an overload condition. Crucial electrical distribution information is instantaneously available to identify which breaker has tripped along with the cause and magnitude of the problem. Event sequence information narrows the list of possible causes to a trip. Immediate identification of problems can shorten downtime from hours to minutes saving production losses.

Increased Productivity

Increased productivity by eliminating the need for time-consuming data collection. Personnel are freed to perform actual maintenance functions that keep facilities operating. Historical archive records and software tools provide simple-to-use tools for collecting energy data for internal and tenant energy billing without manual meter reading or monthly bill calculating.

Load profiles are immediately available for analysis when considering expansion. Spare capacity on existing feeders can be identified through historical load profiling avoiding trips due to seasonal peaks. Correct determination of transformer spare capacity can help avoid unnecessary substation purchases. Double-ended substations designed for redundancy can have their ability to carry loads through a single transformer's outage verified.

Switchgear One-Line Layout Manager

Server Core is Standard With the Functionality of PowerNet

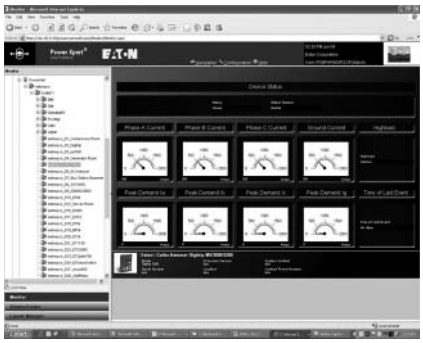
PowerNet (available only with the Server Core DVD)

General Description

The features of Eaton's PowerNet software suite is available only as a standard part of Server Core. PowerNet is a family of software applications, client/ server configuration, that help provide a window into an electrical distribution system. Monitoring and controlling capabilities are included on the Power Xpert Software Server Core DVD for installation on any Windows 2000 or XP and above operating systems.

Features

- ■ Connectivity Bundle
  - ❑ Communication to 1000 INCOM devices
  - ❑ Auto learn of all INCOM connected devices for maximum usability
  - ❑ Security configuration
  - ❑ Trending/Logging configurations
  - ❑ Device set point editing/printing/ viewing
  - ❑ MSDE/SQL data storage
  - ❑ Dynamic Data Exchange (DDE) Server
  - ❑ OLE for Process Control (OPC) Server
  - ❑ Modbus RTU Gateway to data from Eaton INCOM communicating devices
- ■ Power Quality Bundle
  - ❑ Viewing of captured waveforms
  - ❑ Up to eight cycles of actual waveform
  - ❑ Zoomed-in view of high-speed waveform samples
  - ❑ Spectrum chart showing frequency content and magnitude (Fourier analysis)
  - ❑ CBEMA/ITIC representation of events
  - ❑ Top down access to specific Waveform events from event lists and CBEMA/ITIC curves
  - ❑ Trip curve display for coordination and selectivity needs
  - ❑ Log-log coordination curve plottedon-screen for trip units and motor protective relays with the click of a button
  - ❑ Online modification of trip curve pickups and time delays; instant verification of coordination with an updated trip curve
  - ❑ Automatic scale adjustment based on device pickup level
  - ❑ Addition or removal of trip curves directly from the display screen
  - ❑ Color-coded curves tied to the device description for added clarity
  - ❑ Overlay multiple curves
  - ❑ View motor start profiles next to motor protection relay trip curve



PowerNet Digitrip Screen

Table 2.5-1. PowerNet Waveform — Captured Waveforms

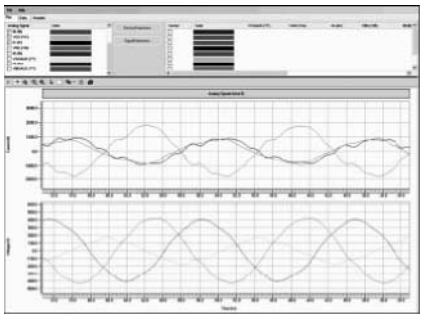
Captured Waveform	Cutler-Hammer Devke				
	IQ Analyzer	Digitrip			MPCV Relay
		910s	1150	OPTIM 1050	
Currents					
Phase A Phase B Phase C	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Neutral Ground	■ ■	— —	■ ■	■ ■	— —
Voltages					
Una-Una Una-Neutral	■ ■	— —	— —	— —	— ■
Ground-Neutral Transformer	■ —	— —	— —	— —	— ■

Server Core Optional Modules/Hardware

Quality Manager

When used in conjunction with Eaton's IQ metering products, lets you see the critical quality attributes for your power system, such as voltage, power, current, transients, harmonics, waveforms and time via a waveform viewer.

- Spot trends faster with easy-to-read graphical displays of real-time information.
- Monitor for voltage disturbances, voltage variances, and more.
- Analyze complex waveforms.
- See trends for historical data.

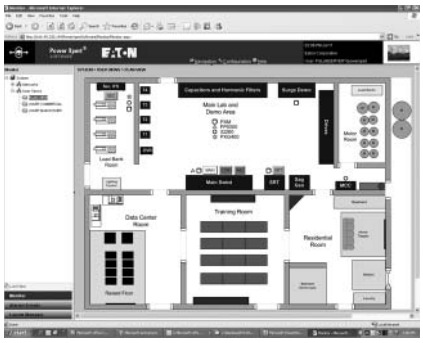


Waveform Analysis Quality Manager

Layout Manager

Lets you model actual physical representations in a virtual replica of your real-world power system.

- Build complete power system diagrams.
- Wide range of symbols and icons.
- Create building groups that mirror your physical facilities or organization structure.
- Create drill-down Web pages to display your data the way you want to see it.



Custom Floor Plan Layout

Power Xpert Modbus TCP/IP Connector

- Connects to and retrieves data from devices using Modbus.
- TCP/IP protocol.
- Modbus Connector provides interfaces to devices from many non-Eaton manufacturers that communicate via Modbus TCP/IP.
- Industry-standard Modbus TCP/IP.
- Flexible import tool to automate.
- Requires user configuration and installation of the tool.

Power Xpert SNMP Connector

- Connects to and retrieves data from devices using SNMP protocol.
- SNMP Connector provides interfaces to non-Eaton devices that communicate via SNMP protocol.
- Industry-standard SNMP support.
- Flexible compiler to process MIB files.
- Requires user configuration and installation of the tool.

Power Xpert Reporting Software (Available 1st Quarter 2009)

Fully compatible with PXS Server Core and PXS Foreseer Class software systems. Reports can be generated in the following categories:

- Capacity
- Energy
- Power quality
- Reliability

As each report is defined, a category is assigned.

- Capacity — Summary report
- Capacity — Branch circuit monitoring report
- Energy — Summary report
- Energy — Cost allocation report
- Power Quality — Basic power quality report
- Reliability — Event report (sequence of events)
- Reliability — JCAHO report

2

Ethernet NetLink

Ethernet NetLink

General Description

The NetLink is a device that embeds the PowerNet Device Server application on an industrial PC platform. NetLink serves as an interface between PowerNet applications and Cutler-Hammer products connected to both INCOM and Modbus RS-485 networks.

Applications

- Bridge multiple Cutler-Hammer Power Management Software devices to an Ethernet network.
- Modbus RTU output for multiple Cutler-Hammer Power Management Software devices.
- Historical data logging.
- Event storage.

Metered/Monitored Parameters

Provides remote access over Ethernet or Modbus to the protective and monitoring parameters of any supported communicating Cutler-Hammer meter, protective relay, breaker or motor starter.

Features, Benefits and Functions

The NetLink translates INCOM Frequency Shift Key (FSK) to standard Ethernet TCP/IP messages or Modbus RTU or to both.

The Ethernet NetLink allows connection of 200 meters and protective relays to an Ethernet Network. Configuration can be done remotely and is stored in non-volatile RAM. The NetLink can be applied on dedicated or shared facility Ethernet Networks.

The Ethernet NetLink is a server for device information to Cutler-Hammer Power Management Software clients on local or enterprise networks. The Ethernet NetLink enables the following functionality:

- Connection of up to 200 Cutler-Hammer meters and protective relays to an Ethernet Network.
- Localized data collection at the substation or equipment building level.
- Data logger capabilities to store event and trend information from attached Cutler-Hammer devices.
- Flexible system placement on dedicated or shared facility Ethernet Networks.
- A 10Base-T port for communications at 10 Mbps on any Ethernet network supporting TCP/IP packets.
- Remote configuration which is kept safe in non-volatile memory.
- Available for purchase with either one or two INCOM ports.

The Ethernet NetLink comes with a 10Base-T communications of 10 Megabaud on any network supporting TCP/IP packets. The NetLink is typically located at the substation or equipment building level. It serves as a distributed data logger for attached devices.

Communications

- Ethernet-Based (TCP/IP via 10Base-T)
- INCOM
- E-PONI
- Modbus RTU slave communications through RS-232 port

Physical Characteristics

- Suitable for panel mounting
- Powered via 120/240 Vac
- 10Base-T connection

Dimensions

- Height: 7.8 inches (198 mm)
- Width: 4.5 inches (114 mm)
- Depth: 9.6 inches (244 mm)
- Weight: 6 lbs. (2.7 kg.)

Mounting Information

The most common location for the NetLink is in a wall-mounted enclosure near a patch panel, a network hub, or a wall-mounted network port. Modbus NetLinks should be mounted in close proximity to the Modbus Master. The distance between the Modbus Master and the RS-232 output should not exceed 50 feet (15 m) without the use of external line drivers between serial ports. The NetLink may be equipped with up to two INCOM device network ports. There will be an additional RJ11 jack and terminal for each INCOM device network. Each additional port will increase network performance in a linear fashion. A 2-port NetLink will deliver the same amount of data from a fixed number of devices in half the time of a 1-port NetLink. NetLinks will communicate with 200 devices regardless of the number of ports.

Catalog Information

Table 2.5-2. Building the NetLink Catalog Numbering System

N L _ _ _

Output	Port Type	Number of Ports
E = Ethernet Output **M** = Modbus Output **D** = Dual Communications Ethernet and Modbus ($1000 Adder)	**T** = 10Base-T Ethernet Port/AUI (standard)	**1** = 1 INCOM Port Communications Network (standard) **2** = 2 INCOM Ports

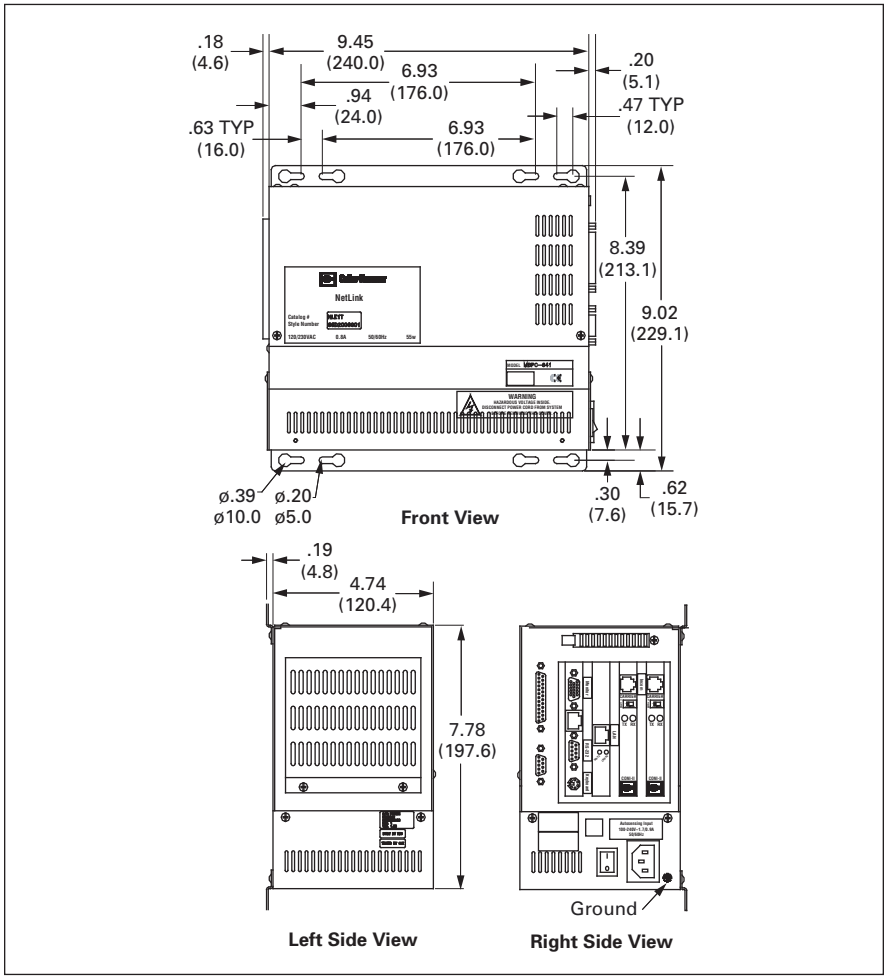


Figure 2.5-1. Ethernet NetLink and Mounting — Dimensions in Inches (mm)

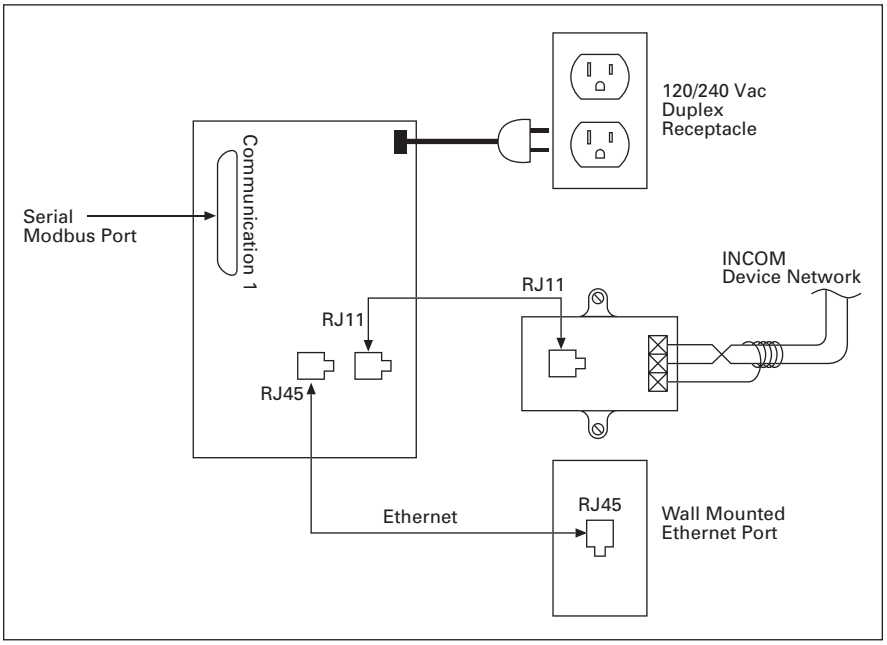


Figure 2.5-2. Ethernet NetLink Wiring Instructions

PowerNet E-Bill

The PowerNet E-Bill bundle provides the following functionality:

- Support for electrical energy as well as gas, water or any other utility that can be measured by the Digital Input Module.
- Accurate Coincident peak demand calculations by patented broadcast capabilities.
- Time of day allocation.
- Holiday and weekend charges.
- Common usage allocation.
- DDE data billing.

Energy Trending of Multiple Metering

- Energy trending.
- Automatic scheduled generation of trends.
- Trending of individual meters and energy users.
- Zoom and pan for detailed analysis.
- Target flags for quick wasteful practice identification.

Table 2.5-3. Software Ordering Guide

Part Number	Description
Power Xpert Server Core Base Product Part Numbers	
PXSERVERCOREDVD	Base package includes DVD and license key
PXSERVERCOREPK	Base package includes DVD, license key, and hardcopy manuals
Power Xpert Server Core Module Part Numbers	
PXSLAYOUTMGR	Custom online graphical Web development module
PXSQUALITYMGR	View captured waveforms from IQ Analyzer, FP-5000, and Power Xpert Meter Series
PXSSNMPCONN100	SNMP compiler and run-time library to connect non-Eaton devices
PXSMODBUSCONN100	SNMP compiler and run-time library to connect non-Eaton devices
Power Xpert Server Core Package Part Numbers	
PXSENGPK	Power Xpert Engineer Package (Includes Server Core, Layout Manager and Quality Manager)
PXSSNMPPK	Power Xpert SNMP Package (Includes Server Core, Layout Manager, SNMP Connector)
PXSMODTCPPK	Power Xpert Modbus TCP Package (Includes Server Core, Layout Manager, Modbus TCP Connector)
PXSTOTALPK	Power Xpert Total Package (Includes Server Core, Layout Manager, Quality Manager, SNMP Connector, Modbus TCP Connector)

Note: PXSERVERCOREDVD or PXSERVERCOREPK must already be installed or purchased with the module to access the modules.

Server Core Hardware/ Software Requirements

Hardware Requirements

Recommended hardware:

- Processor type: Dual core or higher.
- Processor speed: 2.8 GHz or higher.
- Memory (RAM): 4 GB or more.
- Disk space: 15 GB available.
- Video: 1280 x 1024 or higher resolution.
- DVD RW Drive.

Note: The program requires 90 MB of disk space. The amount required for data storage will vary greatly depending on systems' monitoring/analytical requirements.

Software Requirements

Supported operating systems:

- Windows Server 2003 (Standard or Enterprise) with Service Pack 1.
- Windows Server 2003 R2 (Standard or Enterprise).
- Windows XP Professional with Service Pack 2.

Required operating system components:

- IIS 5.0 or higher. (Must be installed prior to installing Power Xpert Software; see the installation instructions in your user manual for details.)
- Microsoft® Internet Explorer® 6.0 or 7.0 only.

Ethernet-Enabled Software Monitoring of IT and Facility Power Equipment

General Description

Using a single Web server connecting to an Ethernet switch, PXS Server Core will communicate directly with Power Xpert devices (i.e., PX Meters, PX Gateways, and PX Gateway Cards), as well as those third-party devices communicating via SNMP or Modbus TCP and an existing PowerNet system server.

Connectivity Components

- PowerNet Domain Server
- Power Xpert devices
- PX Meter 4000/6000/8000
- PX Gateway 400/600
- PX Gateway Cards 1000/2000
- PowerVision Server
- SNMP Connector
- Modbus TCP connector

Options

- Quality Manager helps analyze power by monitoring voltage disturbances, voltage variances, and more. Analyzing complex waveforms, and viewing historical trend data in an easy-to-read graphical display of real-time information.
- Layout Manager allows custom view creation of power system diagrams, building groups, building floor plans of your actual power system. Server Core Web pages can display the data the way you want to see it.

Note: Modbus TCP and SNMP connectors are available for third-party devices that communicate via Modbus TCP and SNMP protocols.

Communication Interfaces

- Web-browser
- Ethernet TCP/IP
- Modbus TCP
- HTTP
- SNMP
- XML/SOAP

Power Monitoring Applications

- Real-time viewing of power/energy readings.
- View trended power/energy readings.
- User-defined events.
- E-mail notification.
- Instantly trend and graph utility information.

Installation Applications

- Low Voltage Switchgear.
- Medium Voltage Switchgear.
- Low Voltage Motor Control Centers.
- Medium Voltage Motor Starters.
- 1-phase and 3-phase UPSs and PDUs.

Communications Applications

- Building Management System (BMS).
- HMI.
- Energy Management Systems.

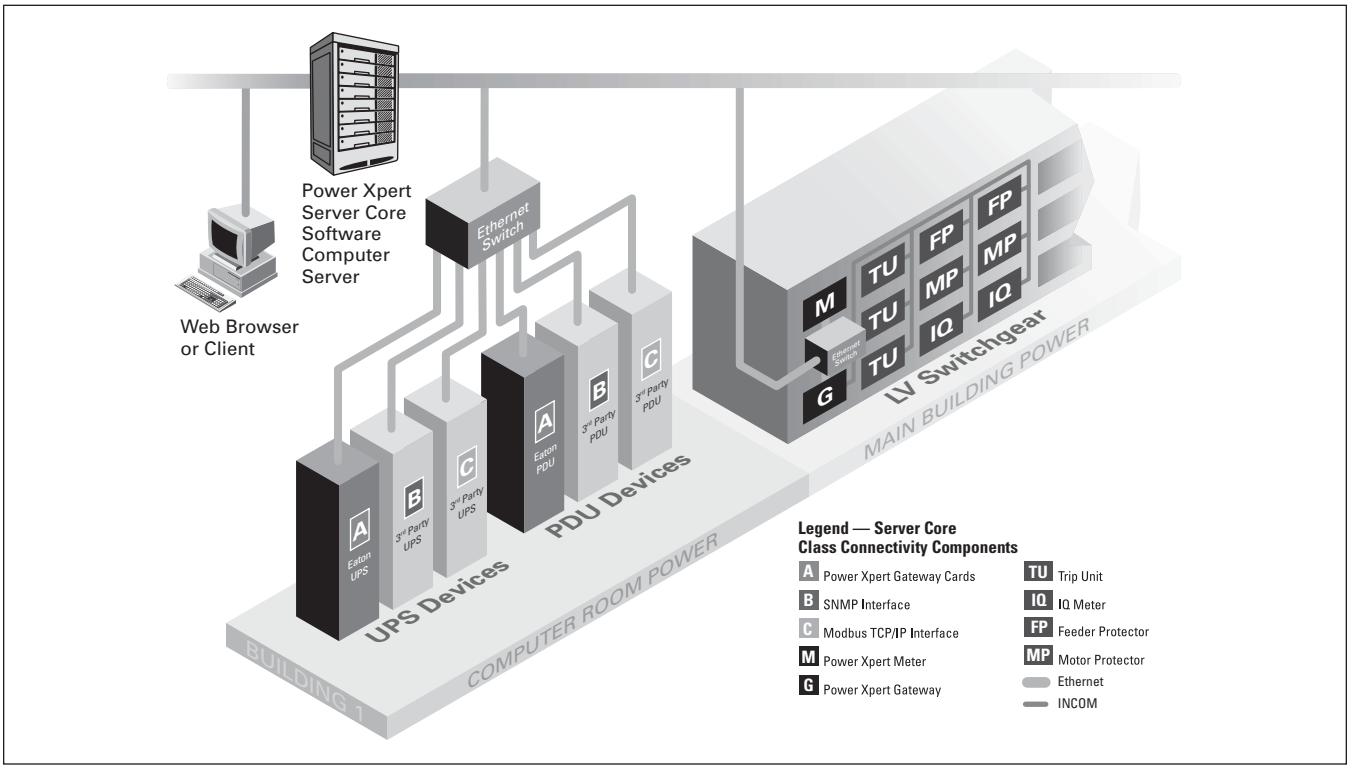


Figure 2.5-3. Power Xpert Software Server Core Application

Power Xpert Software Foreseer Class

Power Xpert Software, Foreseer Class is the solution for those needing to monitor their entire facility or an enterprise's thousands of critical facilities infrastructure pieces, including HVAC, UPS, power distribution generator, fire-detection, security systems, or other communicating sub-systems from hundreds of manufacturers, on one screen. With a vast repertoire of existing or custom designed device interfaces, Foreseer Class allows you to customize your complete monitoring solution, throughout your organization, regardless of size.

Foreseer Class is fully distributable to allow different monitoring capabilities to be deployed at different sites allowing you to purchase only what is needed. Many competitive systems offer a one-size-fits all type approach where you end up paying for more capacity than is needed. With Foreseer Class, you pay for only what you need, when you need it. Here we will describe three systems we have defined:

- N-Class System — Designed for smaller IT or network sites.
- D-Class System — Designed for the large data or communication centers.
- E-Class System — Designed for enterprise-wide applications.

Foreseer Class Systems

N-Class System (up to 3,000 points)

Small systems are available in the form of the Foreseer N-Class server. The N-Class server is an excellent system to get started in the high-performance monitoring world. With the N-Class server, you will receive all the features of the medium and large systems (D- and E-Class) but tailored for a fewer number of real-time monitored and trended data points.

D-Class System (up to 12,000 points)

Medium systems are available to address either a single site with more devices that an N-Class server can accommodate or be used as the management system to connect to one or more remote sites using a distributed architecture design. Foreseer Class software is able to connect to devices at remote sites using multiple N-Class or D-Class servers at each site. Using Foreseer Class in a distributed architecture design provides an effective means to communicate with a minimum amount of bandwidth required over a wide area network. Finally, a medium system can be configured for redundancy. The Foreseer Class redundant server can be added to an existing system to be used in a hot standby mode where in the event that the primary server goes offline for any reason, the backup continues to monitor.

E-Class System (25,000 – 250,000 points)

E-Class systems are available to address large enterprise-based systems as a single centralized site with up to 250,000 monitored points monitored over a wide area network. It also addresses systems through the deployment of a distributed architecture where remote systems are designed for fully functioning standalone systems, but report data back to single centralized server. The Foreseer E-Class server is able to connect to devices at remote sites using multiple N-Class or D-Class servers at each site. Using Foreseer Class in a distributed architecture design provides an effective means to communicate with a minimum amount of bandwidth required over a wide area network. Finally a medium system can be configured for redundancy.

Power Xpert Software, Foreseer Class Available Options

Manager of Managers (MOM) — The Manager of Managers or (MOM) option in Foreseer Class provides for a powerful means to integrate data from multiple locations where each location is running its own Foreseer Class server. This unique feature provides for a very robust and scalable system where the total number of integrated points on the centralized MOM server can be as large as 256,000 points.

Modbus Gateway — The Modbus Gateway option in Foreseer Class offers an affordable and efficient means to export all device information gathered by the Foreseer Class server in a common format via the Modbus RTU protocol. Utilizing the existing RS-232 serial port on the computer running Foreseer Class, no additional hardware is required. Modbus RTU register maps are created using an onboard tool and can be exported to a standard text file for reference when designing the interface for a third-party software package that utilizes the Modbus RTU protocol.

Secure Web Server (https) — The Secure Web Server Option in Foreseer Class provides an encrypted means to protect all data that is viewed via a standard Web browser on the Internet or intranet. Utilizing the Open SSL package from the Internet, Foreseer Class software is able to provide 128-bit encryption between the Foreseer Class Web server and the Web browser client. Both registered certificates from a third-party provider or self-signed certificates are allowed to be used with this option.

Channel Packs — Foreseer Class channel packs are a quick means of expanding your existing Foreseer Class system.

There are three expansion options:

- N-Class system beginning at 1536 channels and expansion through increments of 512 additional channel licenses.
- D-Class system beginning at 6144 channels and expansion through 1024 channel licenses.
- E-Class system beginning at 24,576 channels and expansion through 4096 channel licenses.

Redundancy — Foreseer Class offers redundancy to safeguard valuable information. The inclusion of one or more extra Foreseer Class servers provides the highest possible levels of system reliability. In the unlikely event that one Foreseer Class server fails then the remaining servers can carry the load of the power monitoring system.

To further expand the reach of Power Xpert Software, Foreseer Class, two hardware devices are offered.

The Foreseer Data Acquisition Engine is designed specifically for geographically or physically removed Foreseer Class sites where local IT expertise may not exist.

The Foreseer Data Acquisition Terminal easily integrates monitored equipment and sensors located in small, networked remote sites.

Data Acquisition Engine (DAE)

Data Acquisition Engine (DAE)

Designed specifically for geographically or physically removed sites where local IT expertise may not exist. The Data Acquisition Engine automatically collects and sends data from critical infrastructure devices, such as UPS, generator and power distribution units, and communicates that data, as well as status and alarms, back to the centrally located Foreseer Class server. Using local processing and using the shared bandwidth of an IP network, the DAE reduces the cost required to transmit data to the central server. The DAE can also continues to operate independently and generate alarms even if the connection to the central server is unavailable, increasing the overall availability of the management system.

DAE Technical Specifications

- External Power Input: 115/230 Vac in, 5 Vdc 8 amp out, optional -48 Vdc
- Ethernet: Dual 10/100Base-T Ethernet ports
- Communications Ports: 4 RS232/422/485 and 4 USB ports
- Dimensions in inches (H x W x D): 3.50 x 17.00 x 11.00, 19-inch rack-mount with removable flanges
- Environment: 32° to 104°F (0° to 40°C), 0% to 90% non-condensing RH
- Monitoring: 3,072 channels, maximum of 1,536 analog

Data Acquisition Terminal (DAT)

Data Acquisition Terminal (DAT)

Easily integrates monitored equipment and sensors located in small, networked remote sites. The DAT employs standard Modbus communications to relay information to either a Foreseer Class server or a Data Acquisition Engine over a TCP/IP network. Data is packaged in sequential Modbus registers to enable optimum scan times without impacting network bandwidth.

DAT Technical Specifications

- External Power Input: 100/240 Vac, 47/63 Hz,1 amp (.5 amp at 240) optional -48 Vdc
- Ethernet: 10Base-T, status and activity LEDs
- Communications: Modbus RTU via UDP utilizing TCP/IP Port 7010 or Modbus TCP
- Dimensions in inches (H x W x D): 1.75 x 19.00 x 4.63
- Weight: Three pounds
- Environment: -4° to 185°F (-20° to 85°C), 0% to 90% non-condensing RH
- Discrete Inputs: 16 channels configure as dry contact
- Relay Outputs: 16 channels, SPDT configuration, contacts rated at 500mA, 125 Vac
- Analog Inputs: Eight channels of 12-bit A/D up to 16 digital inputs

Custom Ethernet-Enabled Software Monitoring of IT and Facility Power Equipment

General Description

Using Web servers all connected through your enterprises network to Ethernet switches, Data Acquisition Terminals and Data Acquisition Engines PXS Foreseer can communicate directly with Power Xpert devices (i.e., PX Meters, PX Gateways and PX Gateway Cards), as well as those third-party devices communicating via our multi-vendor device drivers to perform 24-hour, 7 days a week, and 365 days a year monitoring of every communicating point on your power system network.

Connectivity Components

- Power Xpert devices
- PX Meter 4000/6000/8000
- PX Gateway 400/600
- PX Gateway Cards 1000/2000
- PowerVision Server
- SNMP connector
- Modbus TCP connector
- Third-party device drivers

Options

- N-Class System (up to 3000 points)
- D-Class System (up to 12,000 points)
- E-Class System (25,000 – 250,000 points)

Note: All three class systems have available an editing package for editing and creating Web views, but only the Class D and E allow for a redundant server.

Communication Interfaces

- Web-browser
- Ethernet TCP/IP
- Modbus TCP
- HTTP
- SNMP
- XML/SOAP

Power Monitoring Applications

- Real-time viewing of power/energy readings
- View trended power/energy readings
- User-defined events
- E-mail notification
- Instantly trend and graph utility information from multiple locations

Installation Applications

- Low Voltage Switchgear
- Medium Voltage Switchgear
- Low Voltage Motor Control Centers
- Medium Voltage Motor Starters
- 1-phase and 3-phase UPSs & PDUs
- CRAC units
- Standby Generators

Communications Applications

- Building Management System (BMS)
- HMI
- Energy Management Systems

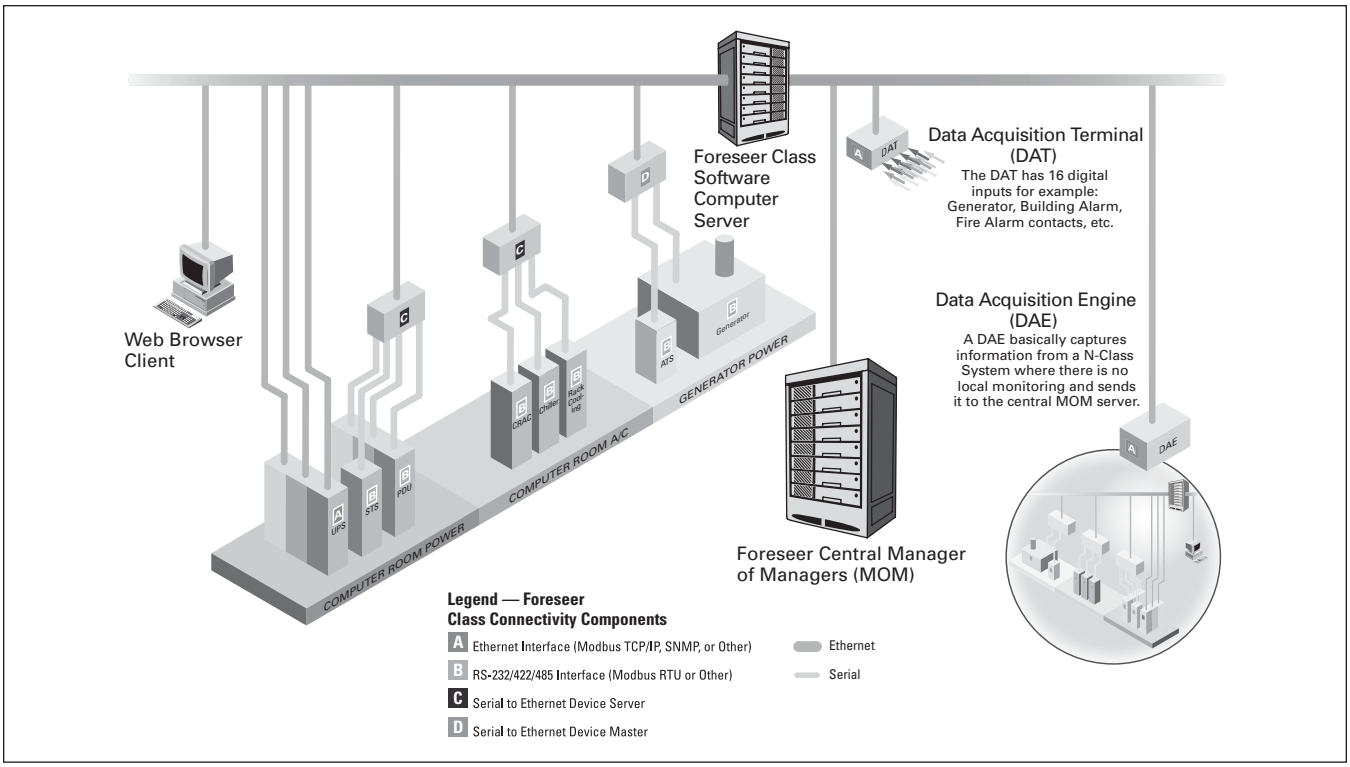

Foreseer Class Software Computer Server
Data Acquisition Terminal (DAT)
The DAT has 16 digital inputs for example: Generator, Building Alarm, Fire Alarm contacts, etc.
Data Acquisition Engine (DAE)
A DAE basically captures information from a N-Class System where there is no local monitoring and sends it to the central MOM server.
Web Browser Client
Foreseer Central Manager of Managers (MOM)
COMPUTER ROOM POWER
COMPUTER ROOM A/C
GENERATOR POWER
UPS
STS
PDU
CRAC
Chiller
ATS
Generator
Legend — Foreseer Class Connectivity Components
A Ethernet Interface (Modbus TCP/IP, SNMP, or Other)
B RS-232/422/485 Interface (Modbus RTU or Other)
C Serial to Ethernet Device Server
D Serial to Ethernet Device Master
Ethernet
Serial

Figure 2.5-4. Power Xpert Software Foreseer Class Application

Power Xpert Software — Foreseer Class

Follow the easy step of consulting with Eaton's Software & Engineering Services Hotline: 1-800-356-3292 for a quotation of a Foreseer system to support your data center and facility monitoring requirements.

Choose the correct base software package to meet your customer's needs. Power Xpert Software Foreseer Class is comprised of a suite of software Server Licenses. Once installed, additional Server Licenses may be added to expand the functionality of your system.

Table 2.5-4. Software Ordering Guide

Part Number	Description
Power Xpert Foreseer Class Base Product Part Numbers	
4CR91051	Class N Base Server Software, V. 4.3, 1536 channel support
4CR91057	Class D Base Server Software v.4.3, 6144 channel support
4CR91049	Class E Base Server Software v.4.3, 24,576 channel support
Custom Web Views Run Time Server License	
4CR91054	Class N Custom Web Views Run Time Server License
4CR91064	Class D Custom Web Views Run Time Server License
4CR91077	Class E Custom Web Views Run Time Server License
Custom Web Views Editor Server License	
4CR91055	Class N Custom Web Views Editor Server License
4CR91065	Class D Custom Web Views Editor Server License
4CR91078	Class E Custom Web Views Editor Server License
Channel Upgrade in Increments	
4CR91085	Class N Channel Upgrade / Increments of 512 channels
4CR91071	Class D Channel Upgrade / Increments of 1024 channels
4CR91072	Class E Channel Upgrade Increments of 4096 channels
Redundant Base Server Software	
4CR91066	Class D Redundant Base Server Software, 6144 channel support
4CR91079	Class E Redundant Base Server Software, 24,576 channel support
Redundant Custom Web View Run Time Server	
4CR91069	Class D Redundant Custom Web View Run Time Server License
4CR91081	Class E Redundant Custom Web View Run Time Server License
Redundant Custom Web View Editor Server	
4CR91070	Class D Redundant Custom Web View Editor Server License
4CR91082	Class E Redundant Custom Web View Editor Server License
Redundant Channel Upgrade in Increments	
4CR91067	Class D Redundant Channel Upgrade / Increments of 1024
4CR91080	Class E Redundant Channel Upgrade/increments of 4096
Class Upgrade	
4CR91058	Upgrade from Class N Server to Class D Server
4CR91083	Upgrade from Class D Server to Class E Server

This page intentionally left blank.

Power Xpert Gateway 400/600

Power Xpert Gateway

The Power Xpert Gateways 400 and 600 work on an open communication architecture. They connect both Eaton and third-party electrical equipment communicating through INCOM, QCPort and Modbus RTU.

Modbus TCP/IP supports integration with third-party monitoring solutions. For example, the gateways send information to a Kepware OPC server, which then allows the data from downstream devices to integrate with third-party HMI and Building Management systems.

Ethernet TCP support utilizes your existing network infrastructure, reducing costs.

For detailed information on the Power Xpert Gateways, please see **Page 2.2-1**.

For detailed information on compatible devices, refer to www.eaton.com/powerxpert.

RS-485 PONI

The RS-485 Product Operated Network Interface card, or MPONI card, enables Modbus communication capability to various Cutler-Hammer products. Each MPONI contains two rotary address switches to uniquely identify each device on the network and a baud rate DIP switch. A 5-pin connector is provided for wiring to the RS-485 network.

Various baud rates are available for networking flexibility, and onboard LEDs indicate operation, error and communication status. The MPONI is applied where a device network exists connected by a dedicated shielded twisted pair conductor. Modbus RS-485 allows a single device or multiple units in a daisy-chain configuration to communicate with another local or remote device and may extend up to 4,000 feet (1,219 m) without a repeater.

The MPONI comes with mounting hardware and attaches to the back of its associated device.

Note: Please see IL for detailed register support information for each supported product. Not all device functionality is supported with the RS-485 PONI over the Modbus Protocol.

DPONI

The DeviceNet Product Operated Network Interface (DPONI) enables communication between a DeviceNet network master station and a host device in a Master/Slave format over a DeviceNet network. The DPONI is compatible with the MP-3000 and MP-4000. The DPONI is powered both by the host product to which it is attached and by the DeviceNet network.

The DPONI uses opto-couplers to isolate the two power systems. The DPONI communicates at 125, 250 or 500 Kbps selected via a front panel DIP switch. All products on the DeviceNet network must be set at the same communication rate. The DPONI has a bi-color network/module status LED which functions in accordance with the DeviceNet specification. An additional monocolor LED flashes while the DPONI is receiving a message from the host device.

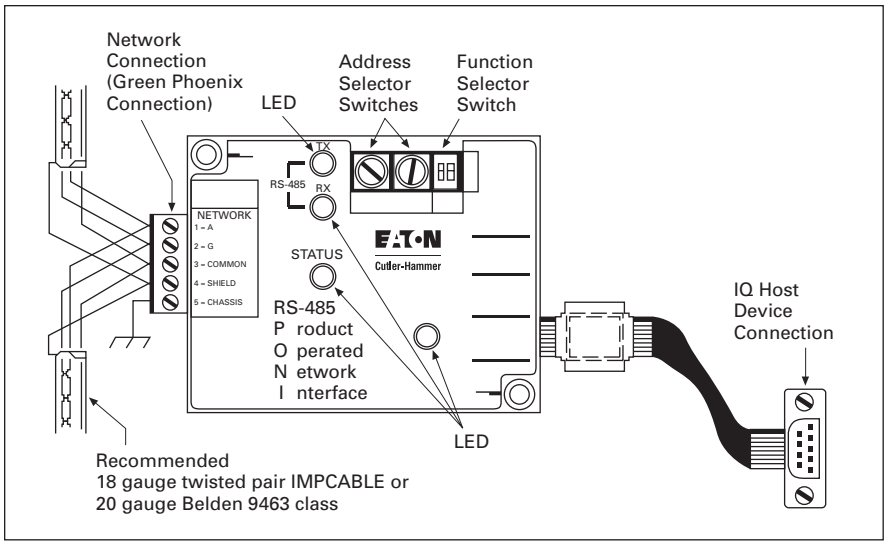


Figure 2.6-1. RS-485 PONI

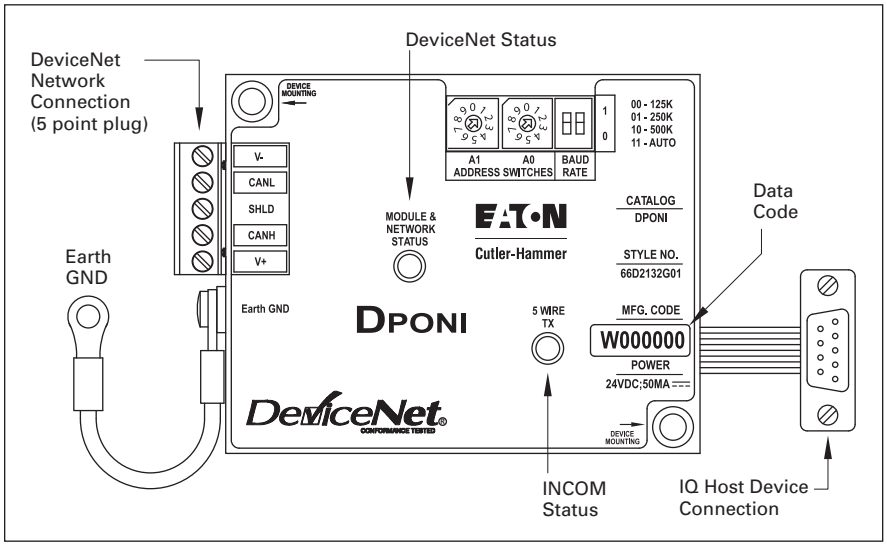


Figure 2.6-2. The Cutler-Hammer DPONI

mMINT

mMINT Module

General Description

The mMINT (Modbus Master INCOM Network Translator) Module is a Cutler-Hammer accessory product that will provide communication between a Modbus RTU network and an INCOM (INdustrial COMmunications) network (see **Figure 2.6-3**). This module is transparent to the Modbus network. It communicates to a master on the Modbus network using the Modbus RTU (Remote Terminal Unit) protocol. It communicates to slave devices on the INCOM network using the IMPACC (Integrated Monitoring, Protection, and Control Communication) protocol. The catalog number of this product is mMINT.

Features

The mMINT module is a slave device on the Modbus network and as such requires a master that will exchange register objects with the mMINT module.

- Handles generic pass-through commands (Modbus/INCOM/Modbus).
- Capable of passing Modbus register objects from Cutler-Hammer existing products and newer PnP (Plug-'n-Play) products to a Modbus RTU master.
- Data in IEEE Floating Point format and fixed point.
- Modbus RTU communications data transfer rates of 1200, 9600 or 19200 baud with 1 start bit, 8 data bits, no parity and either one or two stop bits.
- Up to 32 products connected to INCOM network port (246 unique addresses maximum).
- Flashing Status LED to indicate an active module.
- LED indicators for INCOM transmit and receive communications exchanges.
- LED indicators for Modbus RS-485 transmit and receive communications exchanges.
- Input power for the module from either 120 Vac or 24 to 125 Vdc.
- DIN-rail mount package.
- 0ºC to 60ºC ambient operation.

Module Mounting

When mounting the mMINT, verify that an 11 mm H x 28 mm W DIN rail is used and that it is within an enclosed space.

Simplified Wiring Rules

INCOM Network

The following simplified rules apply to a given system consisting of a single daisy-chained main cable link between master and slave devices (see **Figure 2.6-3**). For more complex considerations including star configurations, please refer to the IMPACC wiring specification T.D. 17513.

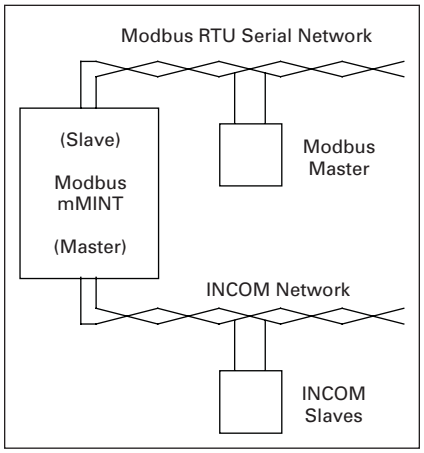


Figure 2.6-3. mMINT in a Communications Network

- Recommended INCOM cable styles are Belden 9463 or C-H style 2A957805G01.
- The maximum system capacity is 10,000 feet of communications cable and 32 slave devices on the INCOM network under the mMINT.
- Non-terminated taps, up to 200 feet in length, off the main link are permitted, but add to the total cable length.
- Make sure that there is twisted-pair wire that is recommended for IMPACC network use. Use shielded twisted-pair wire to connect each slave to the INCOM network, daisy-chain style. The polarity of the twisted pair is not important.

Modbus RS-485 Network

The following simplified rules apply to a given system consisting of a cable link between master and slave devices (see **Figure 2.6-4**). For more complex configurations, please refer to standard Modbus RTU wiring specification rules for the RS-485 network.

- The recommended Modbus cable has twisted-pair wires (24 AWG stranded 7x32 conductors with PVC insulation) having an aluminum/mylar foil shield with drain wire.
- The maximum system capacity is 4,000 feet of communications cable and 247 devices on the Modbus RTU network.
- Make sure that there is twisted-pair wire that is recommended for Modbus RTU network use. Use shielded twisted-pair wire to connect each slave to the Modbus RTU network, daisy-chain style. The polarity of the twisted pair is critically important.

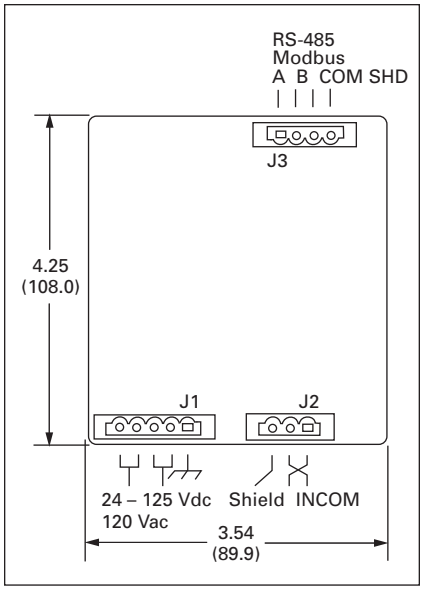


Figure 2.6-4. mMINT Module Dimensions

Burden

- 24 Vac/dc 3 VA

Safety Standards

- UL
- CSA®
- CE mark

Communications Speed

- INCOM: 1200, 9600 Baud
- N2 Bus: 9600 Baud

Note: Contact Eaton for availability and support for the N2 Gateway.

Modbus NetLink

Modbus NetLink

General Description

Communications

- Ethernet-Based (TCP/IP via 10Base-T).
- INCOM.
- E-PONI.
- Modbus RTU slave communications through RS-232 port.

Physical Characteristics

- Suitable for panel mounting.
- Powered via 120/240 Vac.
- 10Base-T connection.

Dimensions

- Height: 7.8 inches (198 mm).
- Width: 4.5 inches (114 mm).
- Depth: 9.6 inches (244 mm).
- Weight: 6 lbs. (2.7 kg.).

Application Description

Applications

- Bridge multiple Cutler-Hammer Power Management Software devices to an Ethernet network.
- Modbus RTU output for multiple Cutler-Hammer Power Management Software devices.
- Historical data logging.
- Event storage.

Metered/Monitored Parameters

Provides remote access over Ethernet or Modbus to the protective and monitoring parameters of any supported communicating Cutler-Hammer meter, protective relay, breaker or motor starter.

Features, Benefits and Functions

General Description

The NetLink translates INCOM Frequency Shift Key (FSK) to standard Ethernet TCP/IP messages or Modbus RTU or to both.

The Modbus NetLink (NetLink M) converts data from as many as 200 meters and protective relays into Modbus RTU registers. Configuration can be done remotely and is stored in non-volatile RAM. The Modbus NetLink uses a register mapping technique to map up to 10,000 read registers for real-time data and read/write registers for control commands for 200 devices.

Note: All 200 devices cannot be high-end devices such as an IQ Analyzer or Protective Relay. Call factory for details.

The Modbus NetLink is a server for Cutler-Hammer device information to Modbus master equipment via Modbus RTU registers over an RS-232 communication medium. The Modbus NetLink enables the following functionality:

- Connection of up to 200 Cutler-Hammer meters and protective relays into Modbus RTU registers.
- A register mapping technique to map up to 10,000 read registers for real-time data and read/write registers for control commands.
- A 10Base-T port for direct configuration which is stored in non-volatile memory.
- Available for purchase with either one or two INCOM ports.

Dual Ethernet/Modbus NetLink

The Dual Ethernet/Modbus NetLink combines the functionality of the Ethernet and Modbus NetLinks into one package. This enables remote monitoring of all connected equipment via the Power Management Software suite, as well as local communications to a Modbus master sharing the available information for two completely separate and independent functions.

Mounting Information

The most common location for the NetLink is in a wall-mounted enclosure near a patch panel, a network hub, or a wall-mounted network port. Modbus NetLinks should be mounted in close proximity to the Modbus Master. The distance between the Modbus Master and the RS-232 output should not exceed 50 feet (15 m) without the use of external line drivers between serial ports. The NetLink may be equipped with up to two INCOM device network ports. There will be an additional RJ11 jack and terminal for each INCOM device network. Each additional port will increase network performance in a linear fashion. A 2-port NetLink will deliver the same amount of data from a fixed number of devices in half the time of a 1-port NetLink. NetLinks will communicate with 200 devices regardless of the number of ports.

Catalog Information

Table 2.6-1. Building the NetLink Catalog Numbering System

N L _ _ _

Output	Port Type	Number of Ports
E = Ethernet Output **M** = Modbus Output **D** = Dual Communications Ethernet and Modbus ($1000 Adder)	**T** = 10Base-T Ethernet Port/AUI (standard)	**1** = 1 INCOM Port Communications Network (standard) **2** = 2 INCOM Ports

CSA is a registered trademark of the Canadian Standards Association. Explorer is a registered trademark of Microsoft Corporation. Modbus is a registered trademark of Modicon, a division of Schneider Electric Industries SA. NEMA is the registered trademark and service mark of the National Electrical Manufacturers Association. UL and cUL are registered trademarks of Underwriters Laboratories Inc. Windows and Microsoft are registered trademarks of Microsoft Corporation. Cutler-Hammer is a federally registered trademark of Eaton Corporation.

This page intentionally left blank.